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The Magazine for Information Executives

Special Section

An Exclusive Michael Hammer-Led
Reengineering Roundtable
Plus, A New Book Hammers Hammer

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IT Revs Up
The Human
Genome
Race

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This man has
just 12 months
to reinvent Colorado's
entire IT operation.
Can he do it?

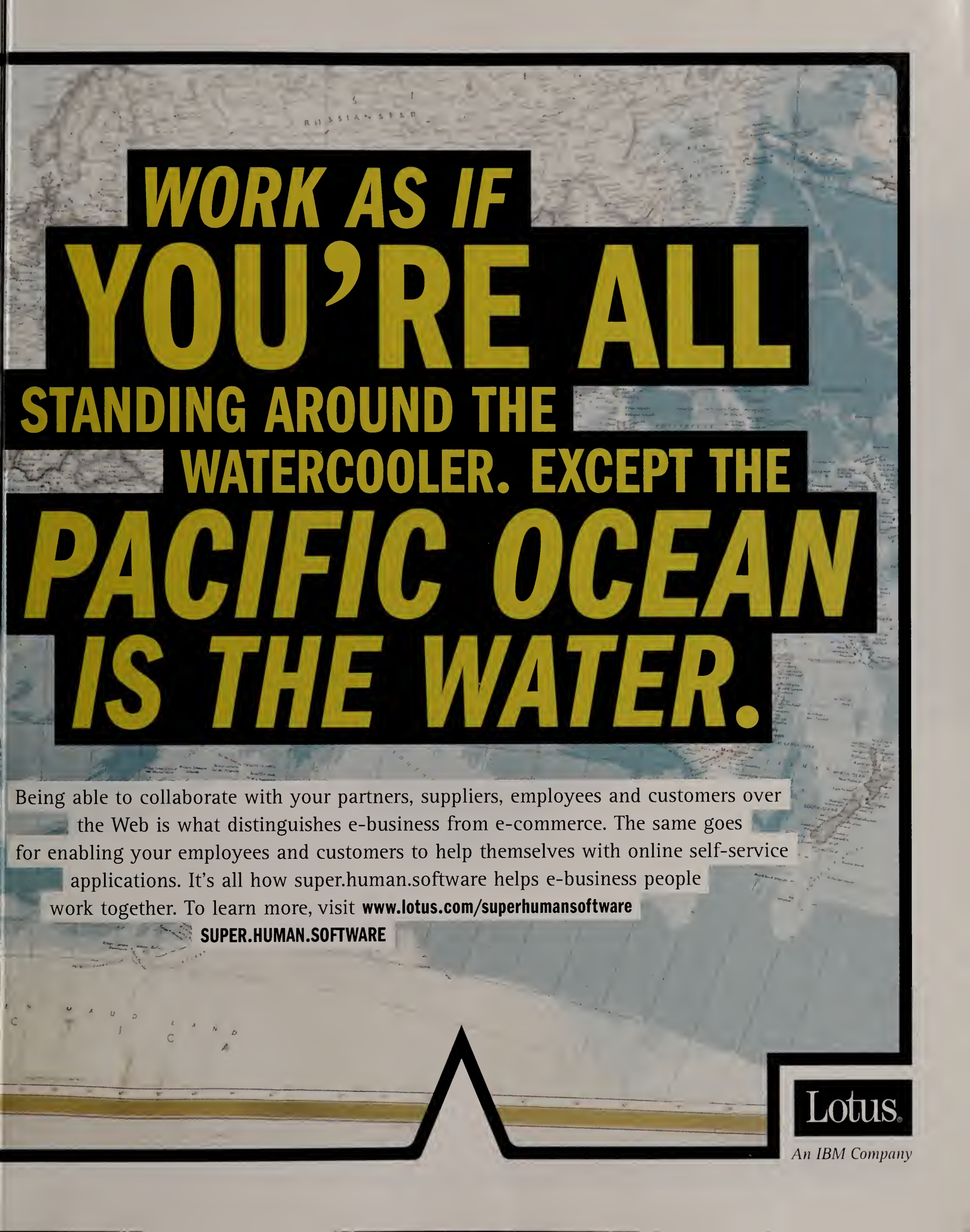
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Cliff Hanger

Colorado temporary
CIO-Paul Quade



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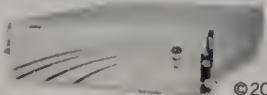
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Cover photo by Geoffrey Wheeler

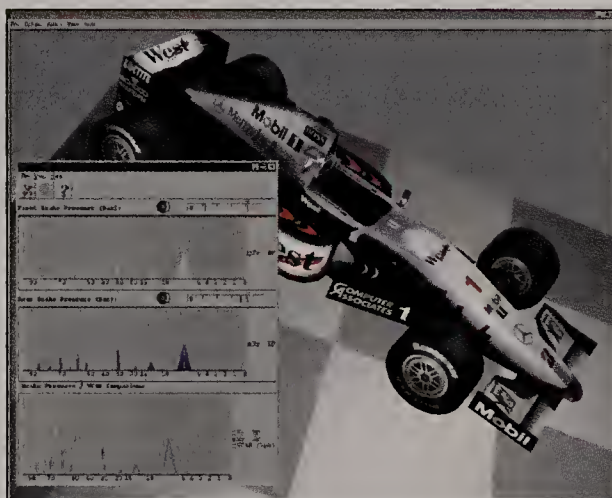
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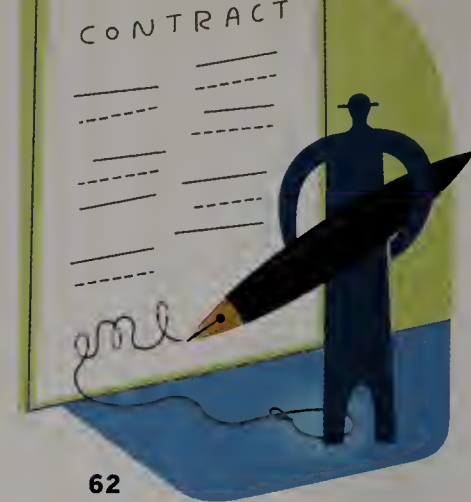
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We are simultaneously entering an Age of Information and an Age of Distraction. From "Buckle Up" 182



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APPLICATIONS ON DEMAND

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Robert J. Davis, President & CEO, Lycos, Inc.

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—Korn/Ferry International's Mark Polansky, responding to a reader question on CIO's Executive Career Counselor site.

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From the Editor

lundberg@cio.com

Pushing the E-Panic Button

There's panic in the air, and once again you're at risk.

A CIO I know got a call from a headhunter about a job at a mega company, brick and mortar, trying to figure out the role of the web in its business. My friend, who knew that company's current CIO (we'll call him Pete), asked, "What gives? Pete's a really smart and accomplished guy—why are they replacing him?" The recruiter said, "The problem with Pete is he's too strategic. This company wants someone with e-commerce experience who's going to come in, roll up the proverbial sleeves and get the job done."

You CIOs just can't win. First you're too techie, now you're too strategic.

Strategy itself has come under fire. There simply isn't time to think things through and develop strategic plans. There's no time for project discipline, either. CEOs and corporate boards are insisting, "You do it (whatever *it* is) and do it now, or we'll bring in someone who can."

This is panic, pure and simple. Things are moving at a breathtaking pace. The market won't wait for you to plot



your plans in the same way you might have five years ago. But that doesn't make it right to abandon all discipline; you've just got to find a new type of discipline, one that takes less time, that's not tied to a single-path future, that is way more open to risk and forgiving of failure. And you've got to convince your fellow executives that this is the right thing to do, or before you know it you'll be in the same boat as Pete.

This is indeed a treacherous time for CIOs. Push back too much and you'll lose your chance to play; abandon all checks and balances and guess who gets burned when things go sour? In the current frenetic environment, it takes real courage—and real astuteness—to help your organization make the right choices and do the right things. Because these days, it's a fine line between charging into a brighter future and hurtling out of control.

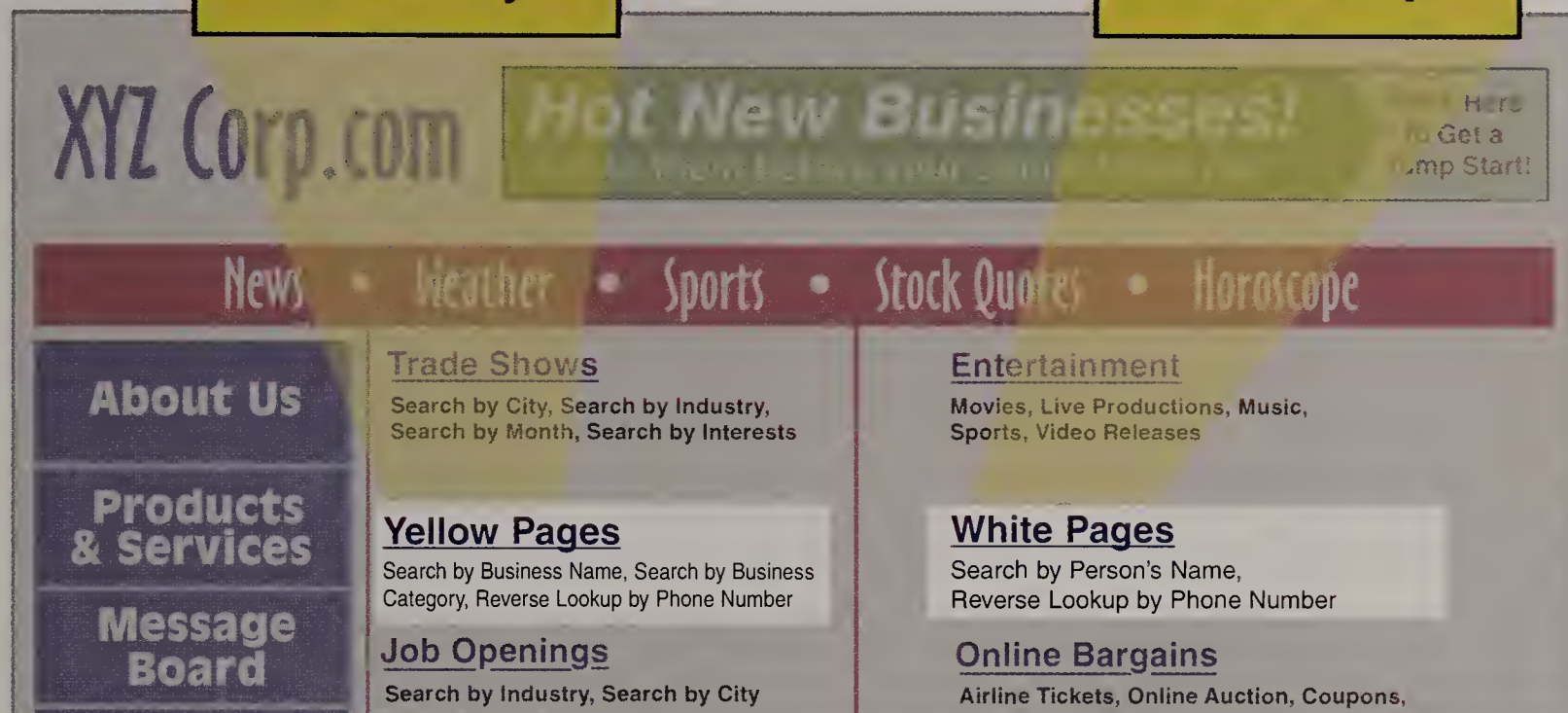
Allie Lundberg

P.S. A few issues back (Feb. 1, 2000), we had a structural problem with a promotional piece that wrapped around our cover. Be assured that all of us at CIO care first and foremost about the experience our readers have with the magazine, and we would never intentionally do anything to interfere with that experience. It won't happen again.

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Reader Feedback

A SIMPLE REQUEST

I have an addition for the "Customer Wish List" that ran with "The Ghost of Christmas Past" [*CIO Web Business*, Dec. 1, 1999]. There is nothing more frustrating than browsing through a catalog, selecting the items you want to purchase and finding out halfway through completing the delivery information that only U.S. addresses are acceptable.

It seems a simple matter to place a note on the home page indicating that goods will be shipped only within the United States. Vendors that fail to do this can be sure that I will never be back to their sites—not to browse, not to shop, not even if they do change their shipping rules.

Faye West • Manager, Information Systems • Alberta Research Council
Edmonton, Alberta • west@arc.ab.ca

SURVEY SAYS...

I enjoyed reading the results of your vendor survey ["Promises, Promises," *CIO*, Dec. 1, 1999]. I urge you to continue performing and publishing these assessments. They not only serve the business and IT managers that read your publication but also the vendors, systems integrators and implementation teams that are readers as well.

Although most professional companies have an internal review process that assesses the quality of their "strategic partnering," it is always beneficial to receive constructive external feedback. In the future, I would certainly look forward to surveys that investigate strategic partnering performance in more detail.

I would also recommend reviewing one area at a time, such as ERP vendors, and providing more detailed results on strengths and weaknesses of individual companies. Focusing your surveys on top companies would not only serve my interests in self-improvement but would also provide useful information to management teams that are struggling to evaluate potential strategic partners.

In my opinion, the number of

insights that a survey of hundreds of companies brings together exceeds the ability of most management teams to leverage their networks for similar information.

David Hawkins
Principal Consultant
PricewaterhouseCoopers
Los Angeles
david.e.hawkins@us.pwcglobal.com

I read with concern "Promises, Promises." At SAS Institute, we're no stranger to statistical analysis, and we're very aware that the manner in which statistically valid information is presented can dramatically affect perceptions. We feel the survey results told a misleading story.

From a general perspective, no software vendor ranked high in this survey, while systems integrators ranked well, indicating that this category of vendors is more likely to

WHAT DO YOU THINK?

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behave in the ways measured. The unanswered question is whether customers expect software vendors to act like integrators. Most of the software vendors in the survey, including SAS Institute, work closely with integrators to make sure customers are able to implement solutions successfully.

Specifically in the data warehouse category, the audience surveyed was incomplete in that it measured only the



perceptions of executives, yet data warehousing is a technology that affects both IT and business units. SAS Institute has historically shown great value to business users, a fact reflected in our customer retention rate of 98 percent.

This year we began directly targeting IT managers with our new Information Delivery Architecture. This architecture features openness, support for multiple data sources, support for standards and multiserver execution with thin- and web-client access. One revealing statistic that was not included in the published results is



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John McIntyre
Director of Global Market Strategy
SAS Institute
Cary, N.C.
john.mcintyre@sas.com

I'd like to suggest some changes the next time you do a vendor survey:

1. Increase the sample size.
2. Consider other categories: application development, large-scale PC deployment, network deployment, IT procurement, technology evaluation, e-commerce.

3. Broader topics such as systems management and data warehousing can be revisited regularly. Targeted applications such as ERP, imaging, groupware, financials and customer relationship management should be reviewed much less often.

4. Suggestions for scoring categories: length of relationship, stability of relationship, ownership of problems, skill level of employees, customer advocacy and industry partnerships.

5. Consider targeting one of the most successful examples and audit the project in light of the scoring criteria. Review the items that were above and below expectations.

Robert Ready
Senior Consultant
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GOOD TEAM PRACTICES

Lynda Radosevich's project management article ["Measuring Up," *CIO*, Sept. 15, 1999] really hit home. I'd like to offer a few tips of my own to help project managers maximize the power of distributed teams and virtual programs:

■ **Provide strong leadership and clarify roles.** Select a team leader who is not a specialist—he or she should have experience in more than one discipline.

■ **Organize and thoroughly develop virtual teams from the beginning.**

Draw a physical map of the locations of all the team members, including time zones and distances.

■ **Link to business strategies and practices.** Make clear how the team's performance will affect the

tion by counting e-mails or by monitoring time spent by individuals in a team-aware environment.

■ **Engender trust. Control politics.** Team members must rapidly learn to trust each other enough to share all relevant information, even if they're afraid it might put them in a bad light.

Edward J. Metzler
Chief Knowledge Officer
Rapidinnovation
Tigard, Ore.
emetzler@rapidinnovation.com

THANKS FOR SOMETHING

Thanks a lot. What a terrible time for this issue [*CIO*, Dec. 15, 1999/Jan. 1, 2000] to arrive on my desk. I have staff on vacation, staff with the day off, sick staff, too much Christmas cheer staff and a few staff like myself who are capable of running the department under these staffless conditions—as long as we are not interrupted (like by your magazine).

This issue is a real page-turner. In frustration I just had to toss it in my briefcase for later reading and just hope I can avoid any excuse to retrieve it until later this evening. So I take out my frustration on you in hopes that when I am done with this I will be attuned again to the keyboard and the job at hand.

Pete Reyburn
Vice President
Sesquehanna Trust and Investment Co.
Lititz, Pa.

BLOOD-CHILLING MISSION

I read "Intelligence Tests" [*CIO*, Jan. 15, 2000] with interest. As a retired U.S. Army Intelligence officer with 17 years in the business, almost all of that time working in an NSA support role, I can tell you that you are not far off the mark. As you leave the "old" NSA building lobby, the following inscription located over the

Thou shalt not hoard knowledge. Not even the team leader can act as a knowledge repository.

company's bottom line and that it will be monitored throughout its deployment.

■ **Create a "seat of all virtual program knowledge."** Thou shalt not hoard knowledge. Not even the team leader can act as a knowledge repository—it must be easily accessible by all team members.

■ **Collaborate with the proper tools and methods.** Technology solves only 20 percent of the problems. The other 80 percent are solved by the way a team works together—working in collaboration rather than by communication alone.

■ **Educate your team about new ways of working to ensure everyone contributes.** While it might not be easy to gauge an individual's level of engagement in a face-to-face meeting, it is easy to evaluate participa-

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exit doors reminds you of its mission: "In God we trust, all others we monitor." I first saw it in August 1978; it chilled my blood then and still does to this day.

Your article does not go far enough. Not nearly far enough.

Robert M. Thomas
Chief Technology Officer
Matrix Direct
San Diego
rthomas@matrixdirect.com

THOUGHTS ON PURCHASING

Your article reminded me of another frustration I have with CEOs who want to buy software to improve their operations ["Dear Leader," *CIO*, Sept. 1, 1999]. For some reason they have an impression that software has the power to create efficiencies and change behavior just by being there. Buying software, they seem to think, is like putting a police car on the side of the road with its lights flashing in an effort to reduce speeding. But what if the problem is that the traffic is moving too slowly?

It seems that understanding what kind of information an operation needs and what sort of impact that information can have on the rest of the organization is a task too difficult and too boring for CEOs to fathom and solve. Few CEOs understand that the information that flows through their company is like the blood coursing through their veins and that all operations, like all organs, must be able to use it naturally. They would rather buy a new organ and force-fit it into the organization than figure out how best to improve the operation and then add the appropriate software tools to support the improvement.

Peter Hawtrey
Managing Director
Triumph Development
Woburn, Mass.
phawtrey@triumph.com

Your article on purchasing brought back terrible memories of my previous employer.

One of the conditions of my accepting a position at my current employer is that I have the bottom line on all computer system purchases. I forward purchase orders to our purchasing department after the fact in order to maintain the paper trail. It works out better for both myself and my employer. I negotiate the best systems for our needs; we receive and implement the technologies in a short period of time and everyone is happy. The return on investment for transferring responsibility to the IS department cannot be measured in just dollars and cents.

My company was uncomfortable at first with that setup but the managers have seen the savings. I recommend anyone moving into a position of technical responsibility to get control of IT purchases. The reality is that the company is the big winner, and isn't that why we are here in the first place?

Robert Bennett
CIO
Newman and Co.
Philadelphia
rbennett@bellatlantic.net

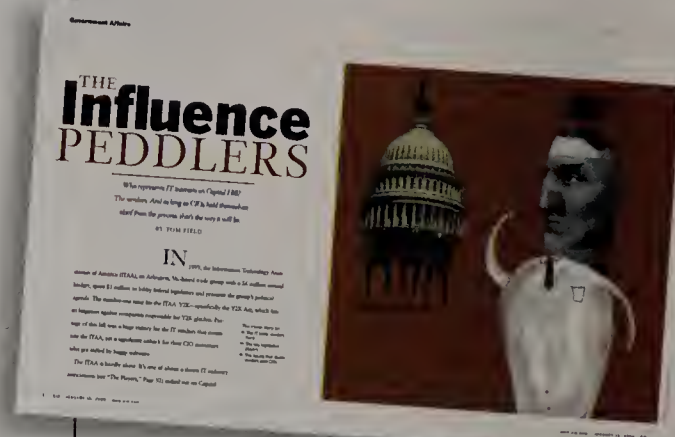
HEALTH-CARE INFLUENCE

I just read your article on CIOs and their influence ["The Influence Peddlers," *CIO*, Jan. 15, 2000].

I have two significant disagreements with your article. You specifically mention that associations "leave IT issues to the IT trade groups." You also mention health care as an example. Both of these statements are inaccurate.

The Health Insurance Association of America (HIAA) is deeply concerned about technology issues that affect our membership. True, technology issues do not represent the core of

our mission, but they are not simply ignored. Technology issues such as e-commerce, encryption, licensing and Y2K are of critical importance to the managed-care industry. As our industry's trade association, we have taken significant steps to ensure that these issues are represented.



The second point that I must take issue with is the mention of the lack of a CIO trade group. I believe that you are overlooking many different groups that exist to represent the CIO in individual industries. For instance, in health care, the College of Healthcare Information Management Executives exists to represent the needs of the health-care CIO. I do agree that there is a need for an association dedicated to the chief information officer. If accountants and lawyers can have one why can't we?

Devin A. Jopp
CIO
Health Insurance Association of America
Washington, D.C.
djopp@hiao.org

CLARIFICATION

A recent story on Visa International ("Formative Years," *CIO*, Dec. 15, 1999/Jan. 1, 2000) didn't give the complete results of the 1997 Belmont Stakes. Touch Gold did indeed pass Free House to win the race, but, most important, the horse also beat out Silver Charm, who was expected to win the race and the Triple Crown.



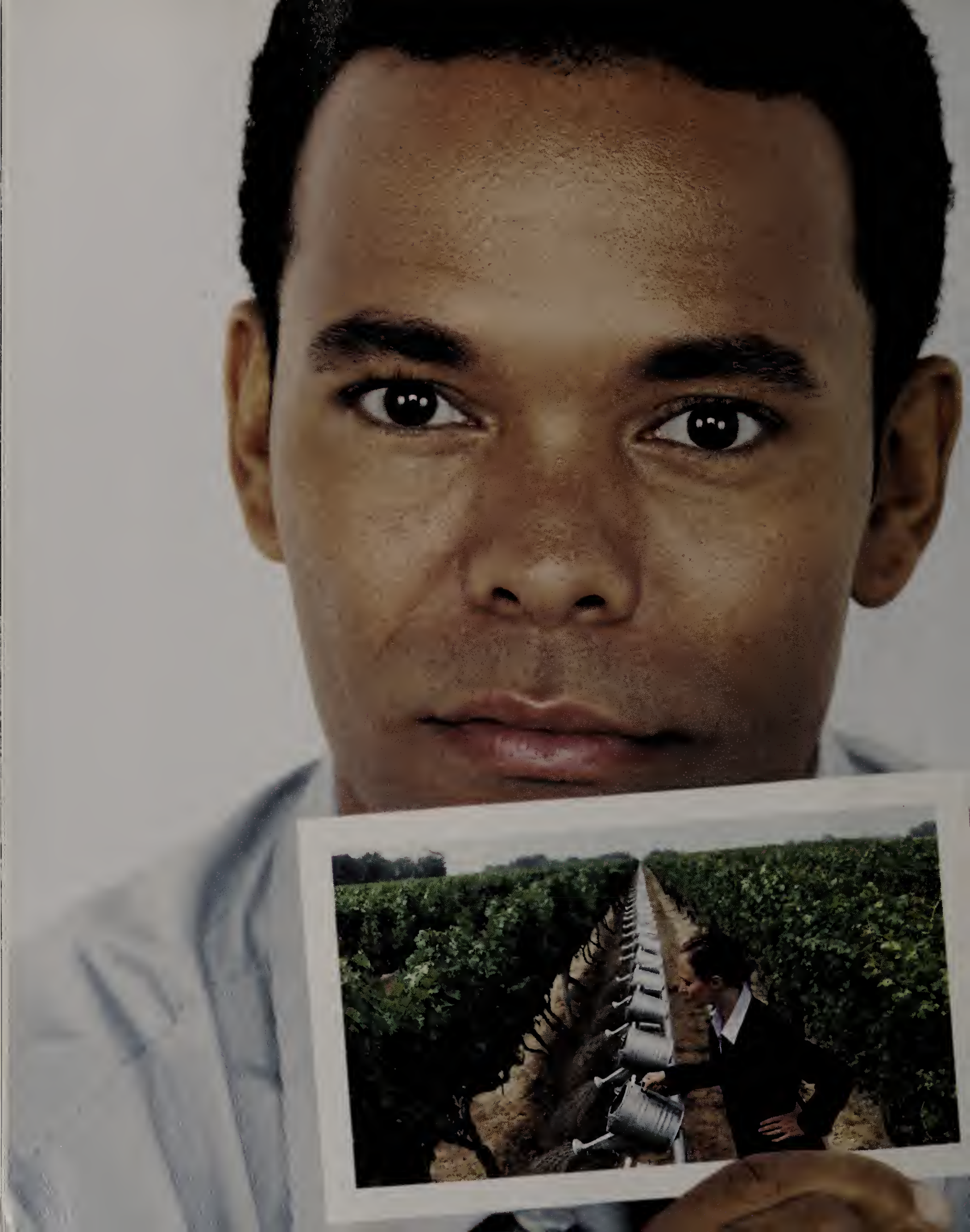
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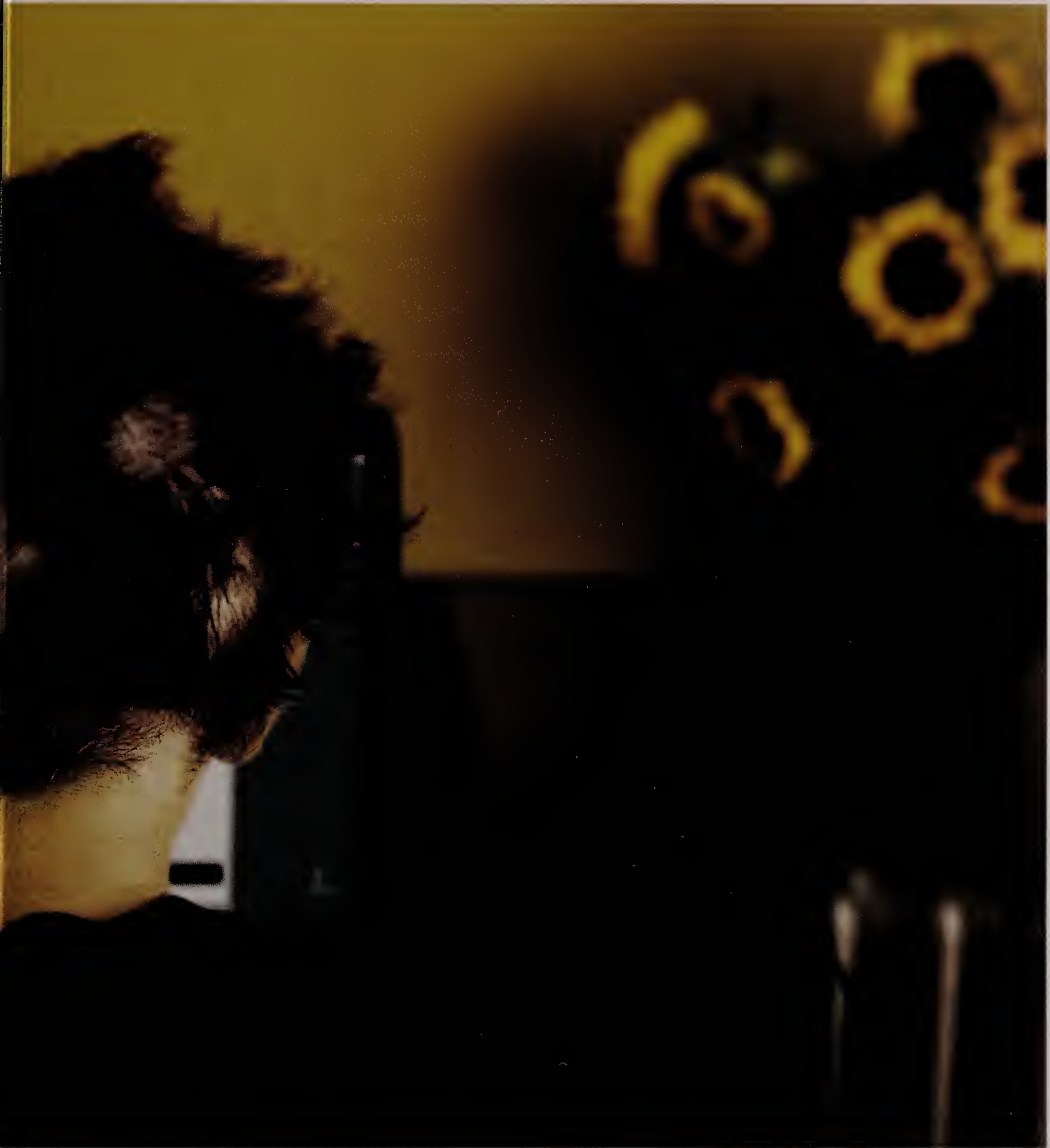
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Edited by Katherine Noyes

TRANSPORTATION

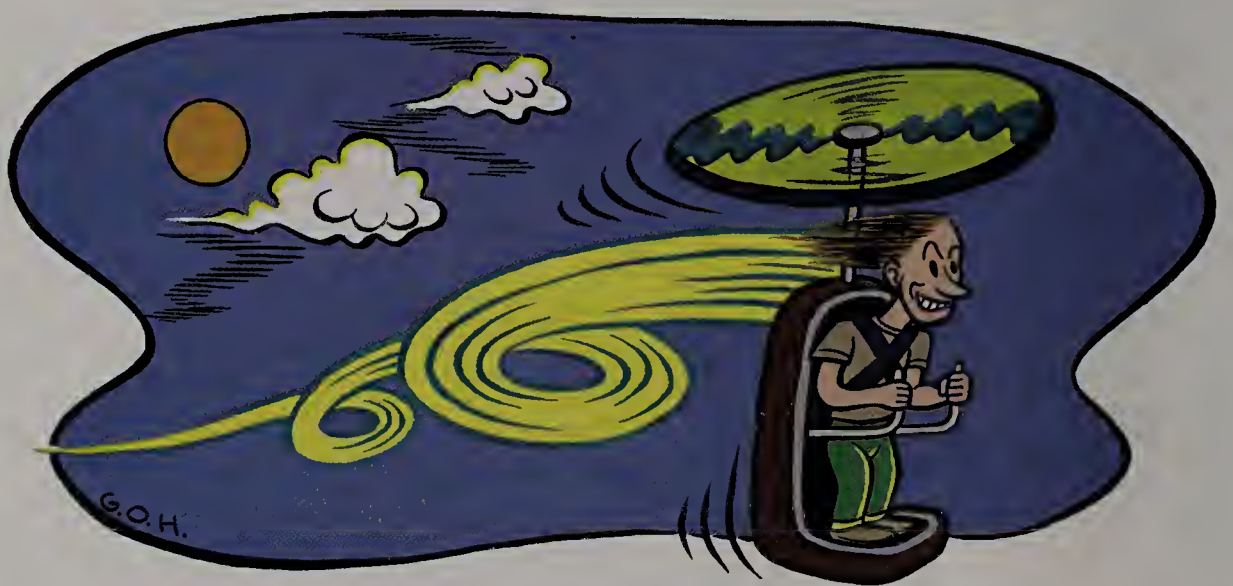
Identified Flying Objects

By Tom Wailgum

ALL JETSONS, *Star Wars* and *Star Trek* references aside, personal flying vehicles are already here. And you'll be seeing some in the skies sooner than you think.

Millennium Jet's SoloTrek XFV, for example, is a step-in and strap-on, stand-up flying machine. The single-person vehicle resembles a cross between a high-tech roller coaster ride and a small helicopter. The pilot hops into the footrests and ergonomically designed backrest and moves the vehicle with two handles at a flexed-arm height. This gets you going up, down and sideways.

Where you lift off and touch down will be up to you; the XFV runs on unleaded gas and has VTOL capability—as



in, vertical take off and landing. Top speeds will hover around 80 mph and cruising altitude is anything below 100 feet, though the XFV has yet to make its

maiden voyage (scheduled for sometime in mid-2000). The cost has not been announced, but Millennium Jet, based in Santa Clara, Calif., says that once it becomes available to the public, pricing will be "equivalent to that of a high-end sports car." Operators must have a pilot's license. Check out www.millenniumjet.com for more information, including the answer to the especially important question, "What happens if the engine quits?"

Moller International's M400 Skycar, on the other hand, has seats for you and three passengers, along with eight engines and three onboard computers for **Continued on Page 36**

Ode to the Shopping Cart

Here's a factoid to break the ice at any party: The average shopper using a shopping cart at a brick-and-mortar mass-market retail store buys **7.2** items, whereas the shopper without a cart buys only **6.1** items.

Translation: Stores with shopping carts enjoy almost a 20 percent advantage. Source: *The Wall Street Journal*



SPACE ISN'T REMOTE AT ALL. IT'S ONLY AN HOUR'S DRIVE AWAY
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Flying Objects

Continued from Page 34

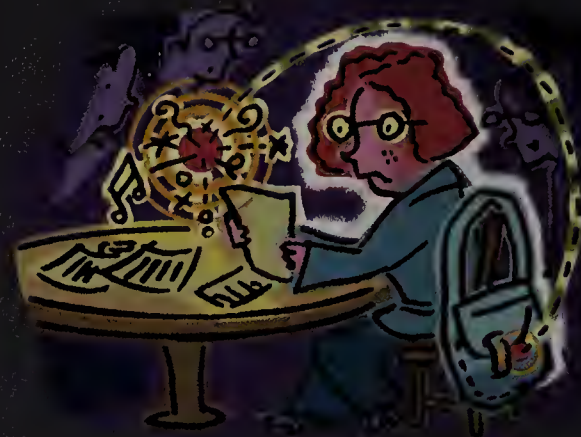
flight management. Like the SoloTrek XFV, it runs on gas and has VTOL capability; however, taking off and landing is only at FAA-approved "vertiports." A pilot's license is required for this one as well.

At first glance, the M400 resembles more of a jet fighter than a flying minivan. It has a fiber-reinforced plastic airframe and has flown to heights of 40 feet. Top speeds are 600 mph. The M400 has done some prototype flying, while the M200X (two-seater) has made over 200 successful flights.

For \$5,000, you can reserve an ordering position for the M400 while it gets FAA-certified for public use—probably in two years. Pricing will be around \$1 million; Moller International, of Davis, Calif., says as more are produced, the price should drop to that of a luxury car. Visit www.moller.com.

You Must Remember This

The birth control pill is among the most effective methods of contraception available, and one of the most popular as a result. But it doesn't take a medical degree to figure out that its effectiveness decreases sharply when women forget to take it—and that happens all the time. In fact, a 1998 Gallup poll found that almost 20 percent of women on the pill complain about having to remember to take it. That's why West Orange, N.J.-based pharmaceutical company Organon has started including an electronic reminder card with all new prescriptions of its oral contraceptive Mircette. The plastic card, which is about the size of a credit card, is outfitted with a microchip timer that can be programmed to beep at the same time every day. It's a subtle reminder in that it can be tucked into a purse or wallet, but the alarm-clockish noise, while not ear-shattering, might get you noticed in a meeting. Visit www.organonwomenshealth.com.

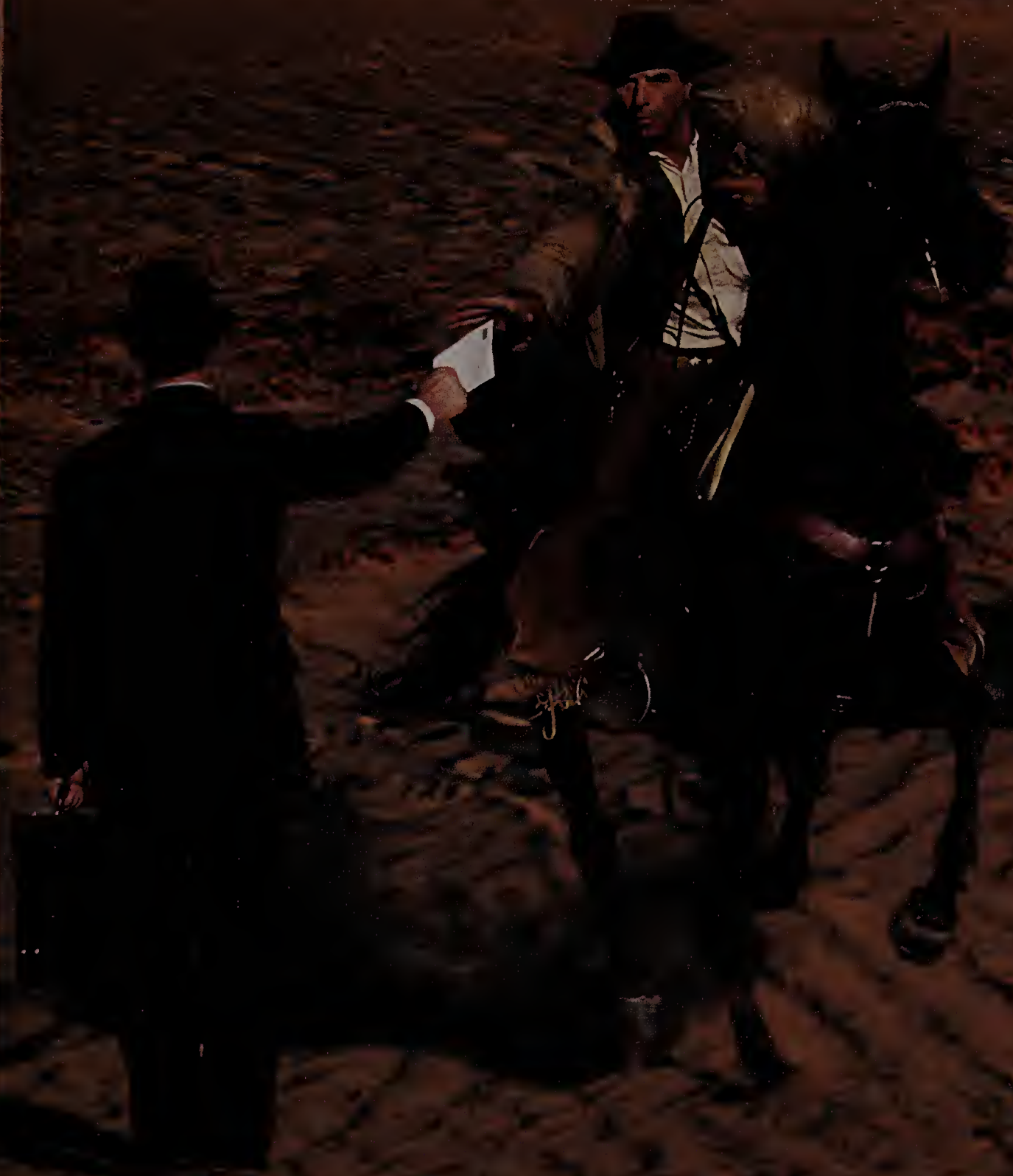


Maynard BY DARRIN BELL



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By the Numbers

Compiled by
Derek Slater

Data Center Performance

Mainframe and Unix data centers require slightly different priorities, according to consulting agency Compass America in Reston, Va. The priority in mainframes is pure efficiency, reducing costs as much as possible. For Unix data centers, the demand for efficiency must be balanced with the need to invest in software tools and extra hardware to achieve necessary service levels.

Mainframe Data Centers

Best-in-class performance metrics for large (800+ MIPS) mainframe data centers

Total cost: **\$9,600 per MIPS**

CPU hardware cost: **\$2,400 per MIPS**

Software cost: **\$3,600 per MIPS**

MIPS per full-time equivalent: **80**

Unit costs decreasing: **12 percent per year**

Large data center capacity growing: **20 percent per year**

Best Practices for IT

1. Grow the workload or outsource to improve cost efficiency. "What we see with insourced data centers is 'grow or die.' If you don't have increasing workload, it's very difficult to get decreasing unit costs. If you aren't growing, you can buy those cost reductions from a vendor, i.e., outsource," says Syd Hutchinson, a senior data center consultant for Compass America.

2. Configure mainframe systems to simplify software licensing. Buying the biggest system possible and going with a single image reduces software costs. Standardizing the software portfolio is also important. "You don't want to do things three different ways," says Hutchinson. "You have to be willing to throw out [redundant] products."

3. Automate processes where possible to reduce staffing costs.

Suggest future topics to numbers@cio.com.

Unix Data Centers

Best-in-class performance metrics
for 50-server Unix data centers

Total support cost: **\$33,600 per server**
(excludes hardware)

Software cost: **\$7,200 per server**
(excludes DBMS)

Servers per full-time equivalent:
3 to 4

Unit costs decreasing:
12 percent per year

Data center capacity growth: **50 percent**
or more annually is not unusual

Best Practices for IT

1. Consolidate onto fewer servers.

"In older Unix environments, we see one or multiple boxes for one application. There's no sharing of applications on a single box. It's a midrange mentality," Hutchinson says. High-end Unix systems that host multiple applications, plus shared disk and shared tape systems, are cheaper and easier to manage. More boxes means higher staff and software costs.

2. Invest in processes and software tools to increase uptime. Here Unix centers have different needs than do mainframe operations. "Unix has seen blazing growth but without the kind of processes and tools that people have in the mainframe environment. We're telling people to spend the money and buy the functionality to get quality up to the mainframe standards," Hutchinson says. Compass's research indicates typical mainframe availability is 99.7 percent (higher for financial businesses). Out-of-the-box Unix availability dips to 99.5 percent.

CLARIFICATION: The Feb. 1, 2000, *By The Numbers* chart on Page 36 omitted two important labels. In each performance measure, the left column of numbers represented "best-in-class" results and the right column "median" results. To see the correct version, visit www.cio.com/archive/020100_trendlines.html. We apologize for the error.

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In a world where a flatter organization is becoming the goal of many companies, Orpheus embodies the concept of teamwork, collaboration and mutual respect that many CEOs talk about but often have difficulty achieving. For each

piece of music the orchestra performs, a core group of 5 to 10 musicians, chosen by a committee (which in turn is chosen by the orchestra), leads the piece. The core group shapes the initial concept of the piece, plans the rehearsal process and has to convince the rest of the orchestra it has chosen the right approach. The orchestra as a whole works together to refine the work, with members chiming in to make suggestions.

The results? "Nothing short of spectacular and breathtaking," says Harvey Seifter, the orchestra's executive director. "We try to unleash

the joy and the creativity and the passion of each member. People call us a leaderless orchestra, but we're actually a multileader orchestra."

So accomplished is Orpheus in its ability to work without a conductor that it has become a unique business model. The orchestra has taken on some consulting gigs with the likes of Kraft Foods and Novartis and has demonstrated its methods for the City University of New York.

-Meg Mitchell



HOT TOPIC



E-COMMERCE

Uneasy Connections

By Megan Santosus

If you thought implementing ERP was tough, just wait. The emergence of e-commerce is bringing with it a new challenge: integrating back-end ERP applications with web-based front-end systems.

That was the prevailing sentiment at "Strategies for Linking E-Commerce with ERP," a conference presented in New

Orleans in December by the International Quality and Productivity Center, a Little Falls, N.J.-based provider of educational forums (www.iqpc.com).

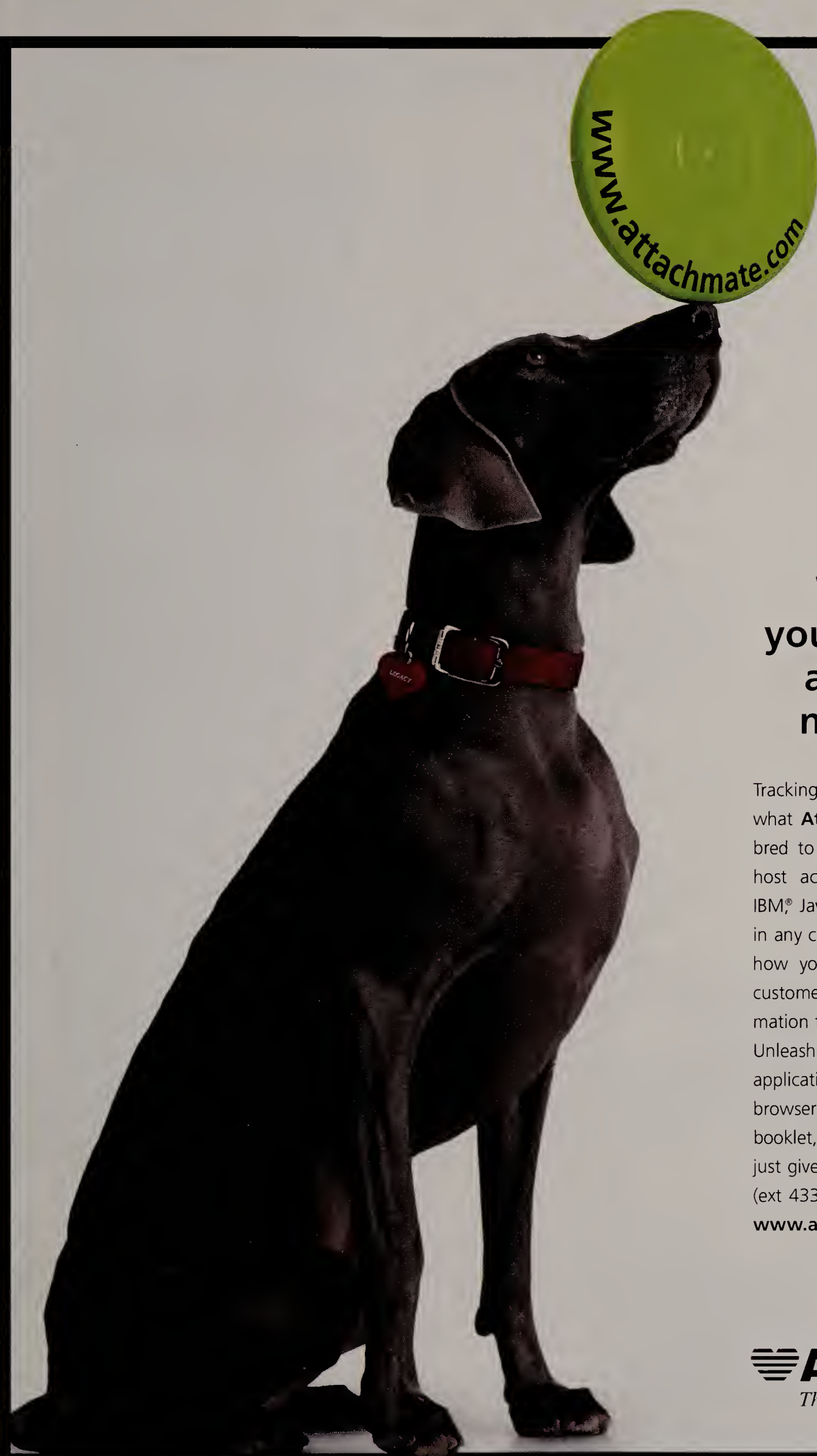
The challenge is a daunting one, but it's also a big opportunity, according to one of the speakers at the conference. "Right now, less than five percent of the top 2,000 CEOs came up through IS," said Randall Nelson, former CIO of Millennium Chemicals and now president of Information Management Associates, a consulting company in Houston. "In six to eight years, e-commerce will propel that number to 50 percent."

With that in mind, about three dozen practitioners, consultants and vendors at the conference swapped case studies and

asked questions about integrating ERP with e-commerce. And while representatives from the likes of Hewlett-Packard, JD Edwards and SAP managed to sneak commercials into their presentations, not one of them claimed that their company's technology would make linking ERP and e-commerce easy.

ERP, which often takes three years to implement, tends to be rigid, internally focused and hard to change. E-commerce systems, on the other hand, are focused externally on customers, partners and suppliers. Ideally, they should be flexible and adaptable, enabling companies to establish and dissolve partnerships on the fly.

A free-flowing discussion at the conference resulted in some actionable advice: Thanks to Y2K, most companies should have a clear picture of the status of their systems, so now is a good time to perform an e-commerce readiness review. First, take stock of your company's resources, both in terms of personnel and computing capacity. Next, gauge the commitment level of executives in the company: Do they feel a sense of urgency? Do they view e-commerce as an opportunity or a threat? Companies should then plan an appropriate strategy that includes integration with existing ERP systems.



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Virtual volunteers—also known as online volunteers, cyber servers, telementors and teletutors—support nonprofit organizations' via the internet.

Volunteers at The Boulder Community Network (BCN) (bcn.boulder.co.us) in Boulder, Colo., build websites and applications for other nonprofits. Jim Harrington, BCN's volunteer coordinator, says many of his volunteers opt to work from home on their own schedules. "We encounter a lot of people with technology skills and a desire to give back to their community, but not much free time to work in the office."

Michelle Walter is a virtual volunteer at Sidelines National Support Network (www.sidelines.org), for example, a La-

guna Beach, Calif.-based organization that matches women experiencing high-risk pregnancies with volunteer e-mail companions. Walter, a full-time mother who relied on e-mails from Sidelines volunteers to get her through her own difficult pregnancy, knows the isolation and frustration these mothers-to-be feel. "These women are all around the country and many are bedridden. We would never have all hooked up without the internet."

Regardless of your service preference, a nonprofit organization likely exists that needs your virtual aid. "The internet is a dream come true for nonprofit organizations," says Jayne Cravens, manager of the Virtual Volunteering Project (www.serviceleader.org/vv) at the University of Texas at Austin, which helps agencies initiate online volunteering initiatives. "Nonprofits are experts in community relationship building, and [that] is the heart and soul of the internet."

—Emelie Rutherford



Unlike the volunteers of yesteryear, virtual volunteers can help out online.

A Bachelor's Dream Come True



One of the great levelers in our time-pressed world is that we all need to bathe, and we all need to clean our clothes. But today a new technology

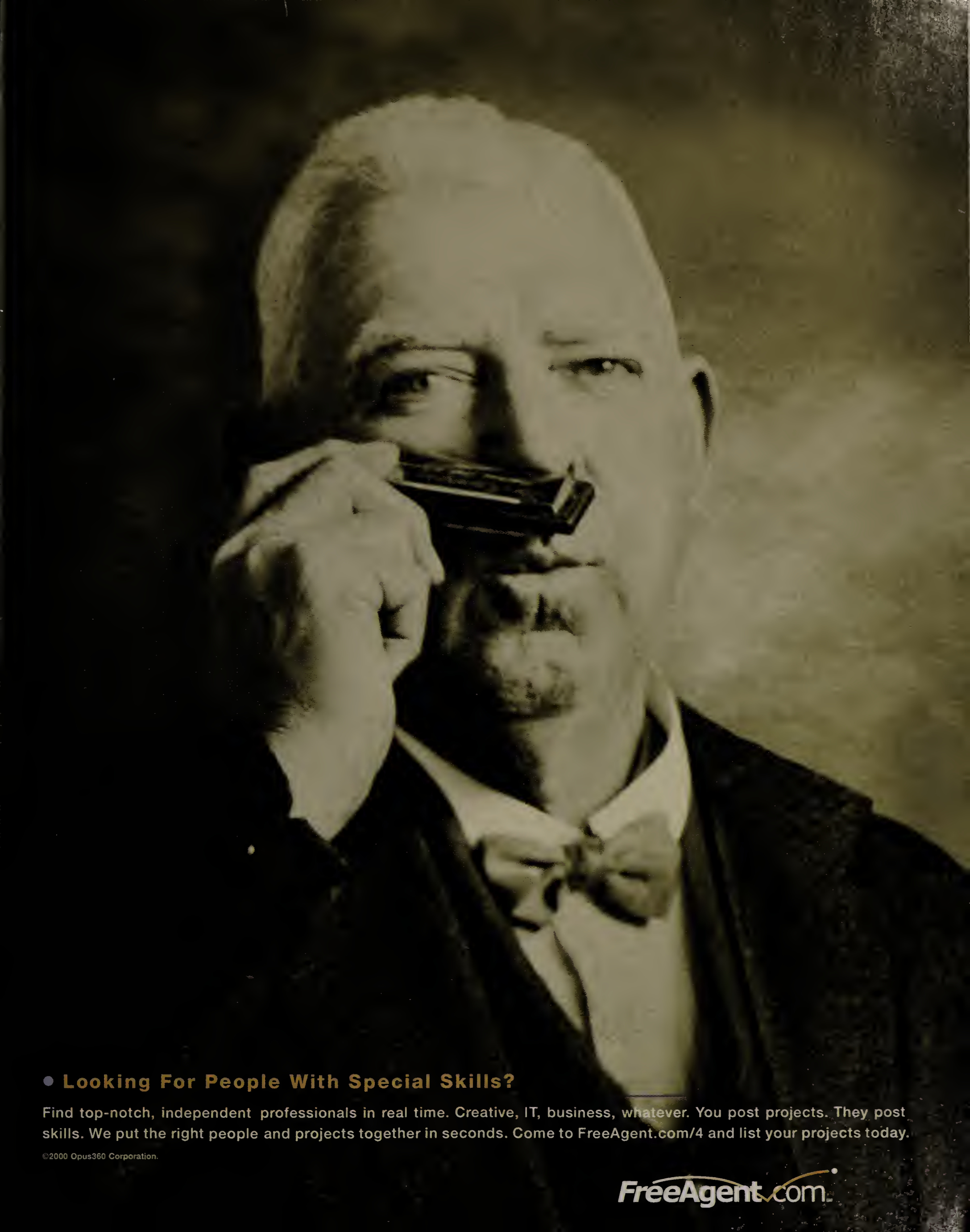
promises to make the latter a little less imperative. Halo Source Corp., based in Seattle, has developed technology to keep clothes fresh for days, even with repeated wearing.

Halo's development is an antimicrobial technology that uses a polymer to bond chlorine atoms to cotton fabrics and cotton blends. Under this patented system, the chlorine atoms work to prevent the growth of bacteria, viruses and other microorganisms—all known offenders to the sensitive nose. The result? You can wear those sweat socks again and again, and they'll remain fresh as a daisy.

Best of all, the technology gets recharged by periodic laundering with bleach. Says Paul Budlong, Halo's marketing manager, this is the "first major innovation to hit textiles since permanent press 30 years ago."

The first products to appear using Halo's technology will be socks, which are due from Halo in the first quarter of this year. Following that, look for athletic clothing, towels and dishcloths, as well as medical linens and kitchen equipment.

Visit www.halosource.com.



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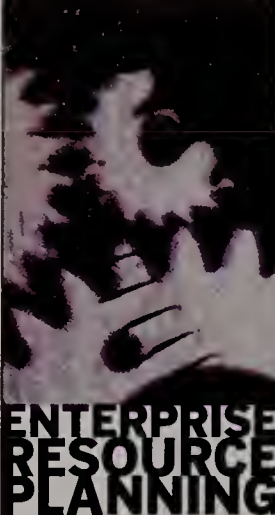
ERP

Extended ERP/CRM

ERP integration



HOT TOPIC



Keep It Simple

By Christopher Koch

Most ERP vendors have designed their software to match the different functional areas of a company, such as finance or sales and distribution. Each little universe gets its own chunk of software loaded with automated versions of the tasks it performs. The different chunks link together so that they can share information with one another.

While that may seem logical to a corporate VP, it can be a confusing mess for employees. About 80 percent of typical ERP users access just 5 percent of the system's functionality, according to IFS AB, a Swedish ERP vendor. Yet when people log in, they get the whole enchilada.

"For the people who use it a lot, a heavy application is fine, but for the guys who just want some information, they need a simple tool," says Johan Peterson, manager of process control systems for Assi Doman, a pulp and paper manufacturer in Kramfors, Sweden.

Peterson's company is experimenting with "role-based portals," which give ERP a more human face by siphoning off only the pieces of the ERP system that a particular job function needs. At Assi Doman, plant managers get the whole ERP fire hose, but plant machine operators get an intranet web page that contains only what they need to report problems with the plant's machines or get troubleshooting help. The screens can also contain links to other company applications or websites that might be relevant.

"It means combining all the information sources that a person in a particular job function needs to see together into a single view," says Brian Johnson, CTO for the Tucson, Ariz.-based U.S. subsidiary of IFS (www.ifsab.com/usa).

IFS claims that its role-based portal program, dubbed IFS Personal Enterprise, reduces ERP implementation time and improves productivity. "If you can get the information you need yourself rather than having to call someone else, then you reduce the queue and wait time for getting jobs done," Johnson says.

ASSET MANAGEMENT

Playing Fast and Loose

AN ORGANIZATION can have the most valuable assets in the world, but if it doesn't manage them carefully, they won't do it much good. In fact, failing to manage assets can do an organization real harm.

Such was one of the conclusions from a recent independent survey, commissioned by Cablessoft, of 239 North American corporations and their methods of network-infrastructure management. A full 77 percent of the respondents admitted they had no network infrastructure management solution in place, preferring instead to keep records on spreadsheets or even in their heads. That can lead to trouble, according to Cablessoft, including extended downtime; inadequate IT reporting to senior management; excessive manual verification resulting in high labor charges and delays; failure to meet E-911 telecomm compliance; and inadequate disaster recovery provisions.

Cablessoft's recommendation? Develop a structured asset-management procedure. Says Pete Pela, CEO and president of the Tempe, Ariz., company, "The only way to ensure you know what's sitting on your network, its age and status is to have a set procedure or solution in place."

Not surprisingly, Cablessoft can help. But regardless of the solution you choose, it would probably behoove you not to fall within the imperiled 77 percent.



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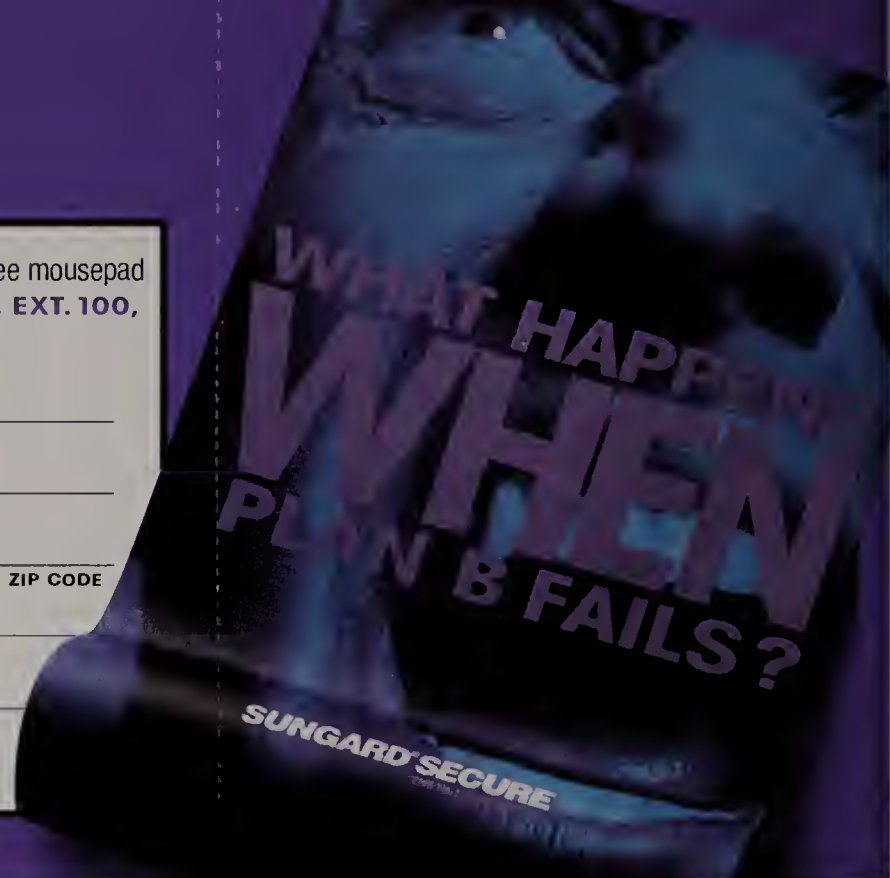
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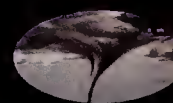
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CIO Connections

Compiled
by Tom Field

Washington CIO replaces ...himself

STEVE KOLODNEY, former CIO of the state of Washington, recently left a new private-sector job...to be CIO of the state of Washington again.

This wild ride began last June 30,

when Kolodney, 57, resigned after a four-year stint with the state. During that time, Kolodney headed up Washington's Y2K remediation effort and built the government's "Access Washington" website. The state twice won the Progress and Freedom Foundation's "Digital State Award" for innovative use of technology. But with these accomplishments under his belt, Kolodney wanted a change, so he accepted a private-sector position as

executive director of the Center for Digital Technology, a government CIO organization affiliated with *Government Technology* magazine.

Yet after just two months, Kolodney found himself longing for Olympia again. He missed state government. "It became clear to me that I can make a bigger contribution from inside the arena than outside," Kolodney told *Governing* magazine, a monthly state and local government journal published by Congressional Quarterly Inc. As soon as Washington Gov. Gary Locke got word that Kolodney might welcome his old job back, he quickly made him an offer—which Kolodney quickly accepted.

In the brief time Kolodney was gone, state employees got a 3 percent raise. So, he not only got his old job back, he got more money too.

Who says you can't go home again?

CIOs on the Go...

Marty Chuck → **Agilent Technologies**

has signed on with Agilent Technologies of Palo Alto, Calif., as the company's first CIO; Agilent, a diversified technology company, is a spinoff of Hewlett-Packard; Chuck is a 15-year HP veteran

Eileen Gabriel → **RCN Telecom Services**

RCN Telecom Services, a Princeton, N.J.-based communications services vendor, has chosen Gabriel to be CIO; Gabriel's immediate challenges are to continue deployment of RCN's new convergent billing and operations support project

Andrew R. Guzman → **Stockwalk.com Group**

Stockwalk.com Group, a Minneapolis-based financial services company, has hired Guzman as executive VP and CIO/CTO; Guzman will bring his systems integration expertise into play at Stockwalk.com

Joshua S. Levine → **E-Trade Securities**

Levine, previously managing director and global head of equities for Deutsche Bank, joins E-Trade Securities as CIO, replacing Debra Chrapaty, who becomes the company's chief media officer

Timothy Monteith → **Domino's Pizza**

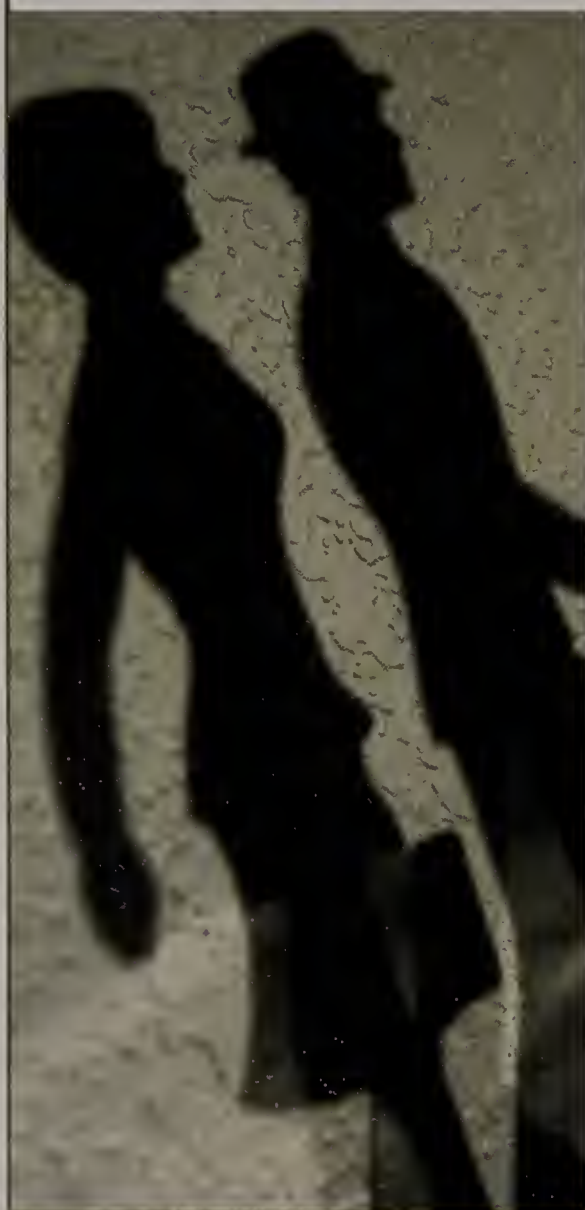
Monteith has become the first-ever CIO at Domino's Pizza, headquartered in Ann Arbor, Mich.; Monteith will report directly to CEO David A. Brandon; among his immediate goals is developing new point-of-sale technologies

Douglas C. Nassaur → **Linuxcare Inc.**

Nassaur has been appointed CIO of Linuxcare Inc., a San Francisco-based Linux support vendor; he previously was VP of technical operations at E-Trade Technologies

Steven D. Sutherland → **CB Richard Ellis**

CB Richard Ellis, the Los Angeles-based real estate services company, has named Sutherland its CIO for the Americas; Sutherland is responsible for developing and delivering common infrastructure and applications for all of the company's American business units



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WHETHER YOU'RE TRYING TO house your Imelda-worthy shoe collection or a company's records, it seems like the available storage space is never enough.

Modern technology still hasn't conquered the shoe problem, but some high-

tech companies are working to make it easier to store data. At NEC Research Institute in Princeton, N.J., Senior Research Scientist Richard Linke and his colleagues are developing a method for transferring data to crystals using holography. Linke makes small changes in the optical properties of the crystals by "writing" data into them. He divides a laser light into a signal beam, which carries the data, and a reference beam, which etches the data into the crystal. Linke says the crystals could store up to 1,000 times more data than today's hard drives. "If I succeed,



it may well change the future storage technology of choice," says Linke.

Storage Technology (StorageTek), based in Louisville, Colo., is also thinking of new ways to help its clients store their digital information. Among the company's offer-

ings is an innovative pay-as-you-

use service, similar to the method electric and phone companies use to charge their customers. Monthly rates range from less than one

cent to several cents per

megabyte. The types of

service include onsite

management of a compa-

ny's data storage; remote

monitoring, in which the

storage system software

and hardware is based at

the customer's site but is

monitored from afar by

StorageTek; and remote

management, which is inter-

net- or network-based storage

that StorageTek manages through a partner's internet data center. For more information, visit www.storagetek.com.

What's the Word?

Try as they might, those Microsoft people have yet to produce a thesaurus that can meet the demands of the average high school student, let alone satisfy the yearnings of an intrepid sesquipedalian or budding etymologist (case in point: the most recent version can't recognize at least two of the words in that sentence).

Enter the venerable Oxford English Dictionary. This month, anxious wordsmiths will for the first time be able to consult the OED online. Subscribers will have access to the electronic edition of the 20-volume dictionary and will be able to display its entries according to their individual needs—by choosing whether or not to view pronunciation keys or variant spellings, for example. They also will receive quarterly updates published as part of an ongoing effort to revamp the lengthy work. For the past 10 years, the OED crew has been painstakingly charting the changes time hath wrought on the English language since the first edition was published in 1928. The \$55 million project is scheduled for completion in 2010.

For more information, visit www.oed.com.

Still not convinced of the value of e-commerce?

Consider this:

Giga Information Group says that U.S. companies saved \$15.2 billion in 1998 as a result of e-commerce, and estimates that global savings will reach \$1.25 trillion annually by 2002.

"I.T. IS NO LONGER A PRESCRIPTION DRUG. TODAY, IT'S OVER-THE-COUNTER."

—Howard Rubin, CEO of Rubin Systems Inc. and research fellow at Meta Group, speaking at a recent SIM conference in Atlanta

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Davenport On...

Long Live ERP

Reports of the demise of enterprise systems have been greatly exaggerated

BY THOMAS H. DAVENPORT

AS I HOPE you have recently read in *CIO*, I have just written a book—*Realizing the Promise of Enterprise Systems* (Harvard Business School Press, Feb. 2000)—on how organizations can use and get value from enterprise resource planning, or ERP, systems. In the course of publicizing this tome, I've come across what seems to me a bizarre, if somewhat implicitly articulated, idea: We don't need big enterprise systems anymore, because we've got the internet now.

Of course, I could chalk it all up to the usual retro-amnesia we encounter when any exciting new technology comes along. When PCs and client/server systems emerged, everyone predicted the death of the mainframe. Yet big-iron systems still beat away at the heart of the vast majority of large organizations, and IBM maintains a tidy business in selling and supporting these supposed dinosaurs. Similarly, fiber optics hasn't made copper wire extinct, and object-oriented programming has hardly done away with conventional programming approaches. The new technologies get all the press and are usually accompanied by revolutionary rhetoric: "Free your organization from the tyranny of the (fill in the blank)." Some-

how, however, the old stuff lumbers along and is sometimes even rehabilitated. (Mainframes don't seem nearly so oppressive anymore, do they?)

So before dismissing chants of "ERP is dead, long live the internet," I engaged in some serious, if not totally objective, thinking about whether they contained any truth. Is ERP still the business necessity it became in the 1990s? Is there something about the internet that invalidates the premise of integrated applications? In short, no. However, since I have a vested interest (i.e., book royalties) in arriving at that particular answer, you might want to read on to check my logic.

My favorite analogy to the world of IT has always been plumbing. Information is water, telecom is pipes, computers and software are valves and fixtures. If you ask me, the internet is more pipes than anything else—fundamentally a distribution medium for information. Of course, the information



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that flows through the internet is getting more amenable to processing all the time, with advances like Java and XML. But it's still processed on computers by applications, and I would argue that the best business applications around are still the enterprise packages offered by major vendors.

Of course, there are exceptions for point-specific applications. In procurement, for example, you could plausibly argue that the e-commerce-driven applications from companies like Ariba and Commerce One are as good as, if not better than, anything you can get from a mainstream enterprise system vendor. This is particularly true if your culture values autonomy and decentralized purchasing over centralized control. But there are two problems with having the argument in the first place. One is that these e-procurement vendors have alliances with enterprise vendors and are reasonably happy to allow

Is there something about the internet that invalidates the premise of integrated applications? In short, no.

their customers to interface their systems with the broader applications suites that pull all the different kinds of information together. The deeper, underlying problem with point-specific e-commerce applications is that they will never—at least not in the next decade or so—be able to achieve information integration within companies.

Forced Integration

The key to the value of enterprise applications is the integration they force on companies' information and processes. Sure, it seems tyrannical while you are going through implementation, but it is worth the trouble to have key information mean the same thing throughout the business, and to have key processes performed in a similar fashion. The integration allows companies to offer services like available-to-promise inventory, which means that the customer doesn't order something that can't be delivered on time. If your procurement systems aren't integrated with your sales, manufacturing and logistical systems, available-to-promise is just a tantalizing mirage. A lot of e-commerce companies, despite their highly web-enabled applications, just can't do it.

I don't see how an organization that relies on internet-enabled applications can achieve integration of this type. If you've got an e-procurement system from one vendor, an e-HR system from another and an e-finance application from a third supplier, how are you ever going to determine, for example, the current value of your assets? Perhaps you could get all of these different applications to talk to each other, but

doing so is about as likely as integrating the "best of breed" applications was a few years ago.

If you're heavily into internet ideology, you might retort that in the e-economy it's more important to integrate with external e-business communities than with your stodgy colleagues in finance. There's no evidence for this, but you'll make a much better partner with other companies if you can back up your commitments to them by delivering on time, shipping all components at once and selling only what's profitable.

Portal Versus Portal

Enterprise software vendors, of course, have realized that they need to get with the program on interfacing their offerings to the internet. All have now achieved full internet compatibility from a marketing perspective, and some have even begun to

deliver software functionality. If they can move quickly enough to placate restless customers, they've got a built-in advantage: It's easier to build networks of companies that have the same enterprise software. If I've already installed the same system as most other compa-

nies in my industry, it means I already have highly similar information and processes to those other companies. Agreeing with these companies on standards and connecting with them to do e-commerce will be a lot easier than with companies that haven't gone through an enterprise systems implementation.

SAP AG recently announced, for example, that five German chemical companies had agreed to use the vendor's internet capabilities (broadly known as mySAP.com) to form an e-commerce network with five of their suppliers. All of the chemical companies have already installed R/3, SAP's enterprise applications package. Look for more of this sort of thing in the future from industries in which several companies have adopted the same enterprise package.

I think we can also expect to see many e-commerce companies beginning to install enterprise application packages. The first priority of e-commerce companies may be to advertise on television to get some customers. Their second priority will be to treat their customers right. In order to do that, they're going to need the same information and process integration that their brick-and-mortar forebears have been struggling with for decades. Some things change, some things don't. **CIO**

Thomas H. Davenport is a professor of management information systems at Boston University School of Management, director of the Andersen Consulting Institute for Strategic Change and a distinguished scholar in residence at Babson College. He welcomes reader comments at davenport@cio.com.



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Career Counsel

Mark Polansky Offers Advice to Aspiring CIOs and IT Managers

The Compleat Noncompete

Q: At what level is it appropriate for a company to require an employee to sign a noncompete agreement? And is it appropriate for a company to require that a noncompete agreement be signed without offering a contract package?

A: A noncompete agreement, in which an employee agrees to not work for a competing company for a specified period of time after leaving his or her current employer, is, by definition, part of a contract between the employee and the current employer. These agreements are made in return for consideration, such as the employment contract package itself, which will typically provide for an employment period or other employment-guarantee terms, a severance provision, some increased compensation factors, or very commonly an equity or stock options grant.

Such contracts are becoming more common, and while usually encountered at the CIO level, they are moving down the food chain of all types of management. Make sure the consideration is worth the restriction, and if you don't think that you could obtain employment outside your company's circle of competitors, then it's probably best not to sign and time to move on to a less restrictive and possibly less lucrative situa-



tion. In any case, you must consult legal counsel, even if the contract you are offered seems routine.

SEEKING STRATEGIC SKILLS

Q: I am currently an assistant vice president of IT in a Fortune 500 company. Can you recommend any one-week programs to help develop the organizational and strategic thinking skills to get to the next level?

A: There are several options to consider. Look at the professional development and training-oriented organizations such as the American Management Association (www.amanet.org) that have long lists of available publications, books and seminars. And many of the top name university business schools run one-week seminars during the summer and other school break periods, as well as long-weekend seminars during the school year. A few of them advertise regularly in *The Wall Street Journal*—like New York University's Stern School,

ILLUSTRATION BY DOUG ROSS



how well is your company prepared for conducting e-Business?

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CERTIFICATION REQUIRED

Q: I am a member of senior management in an IS department for a \$17 billion retailer. I am responsible for all administrative aspects of the IS department—budgets, staff development, risk management and so on—have what I think is a well-rounded background including applications development, operations, and implementation planning and execution with 15 years' experience. I am interested in pursuing a CIO-level job. I have recently come across a job posting that requires CIO Level-1 certification. What is this certification and how does one go about getting it?

A: The certification requirement you have encountered refers to the Capability Maturity Model (CMM) of the Software Engineering Institute (SEI), a federally funded research and development center sponsored by the U.S. Department of Defense and operated by Carnegie Mellon University. The SEI's

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mission is to provide leadership in advancing the state of the practice of software engineering to improve the quality of systems that depend on software. The SEI expects to accomplish this mission by promoting the evolution of software engineering from an ad hoc, labor-intensive activity to a discipline that is well managed and supported by technology. Visit its website (www.sei.cmu.edu/sei-home.html)—it is rich with information and has an online newsletter and lists of publications, courses and conferences about CMM.

MENTOR WANTED

Q: I've been in IT, specifically the support arena, for about 10 years. I'm now working as IT director for a midsize ad agency, and the CEO is talking to me about becoming a CIO. While I

have confidence in my background, I know there's a whole world of experience and learning to be done. I have heard a lot of good things about finding a mentor, but I'm having difficulty finding any good ways of doing so. I'm fairly new to the city I'm in and still learning about the local businesses. Any ideas or paths to approach this?

A: Congratulations on earning the opportunity to become a CIO. Yes, a mentor is a great idea. Join the local chapter of SIM, the Society for Information Management (www.simnet.org), if there is one near you. Find out about the other ad agencies in town and see if their CIOs are interested in getting together, either one-on-one over lunch or a drink after work, or perhaps in a group at a monthly or quarterly breakfast roundtable. And, of course, reach out to the CIOs of the major corporations and public sector organizations in your city and try to connect or organize similarly. As you talk with and meet these individuals, perhaps you will find yourself bonding with one in particular, someone who you communicate well with and vice versa, who will serve as your mentor. (If you'd like to participate in CIO's Virtual Mentor series, please e-mail Senior Executive Editor Richard Pastore at pastore@cio.com.)

SERVING ON BOARDS

Q: I am currently in a senior-management-level position, recently graduated with an MBA and hope to move into the executive ranks. I see many executives serve on the board of trustees for various organizations. How does one become involved at this level?

A: Most chief information officers who serve on corporate boards of directors are individuals who are acknowledged to be the very best and brightest CIOs in America, and they generally serve on the boards of technology-oriented companies. These opportunities are usually obtained through high visibility in industry earned through speaking and publishing, through business connections and relationships, or through the board services practices of the major executive search companies.

YOUNG AND RESTLESS

Q: I am 31 years old and have a bachelor's in computer science, an MBA and about 10 years of work experience. I have been freelance consulting for the last two years on software configuration management. Am I too young for a CIO position? Should I remain in a consulting position from a future-thinking point of view?

A: I don't think that anyone is ever too young or too old to be a CIO. Although it would be unusual to be a CIO at 31,

DON'T BURN WHAT YOU EARN



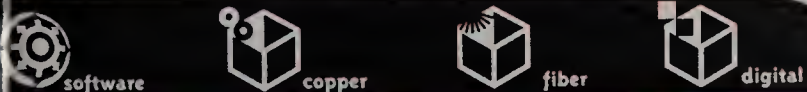
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the question—as well as the answer—is not one of age but of experience and qualifications from both the technical and personal skill perspectives.

You haven't told me anything about your 10 years of experience, but I will safely surmise from the work you are doing now in software configuration management that you are not getting the type of experience you will need to prepare for a CIO position—namely IT strategic planning, budgeting, IT investment portfolio management, enterprise/business applications development life cycle and managing managers.

In the world of companies that build and market hardware, software and services, the CTO title is usually reserved for the chief product planning and development individual.

AN MBA PROSPECT

Q: I am an IT professional and hold a degree in MIS. I am a manager at a consulting company and oversee software and networking projects. Would an MBA be essential for me to obtain an executive-level position, such as a CIO or CEO? If one achieves a CIO position, how likely would it be to ultimately become the CEO of a company?

A: The MBA question and my answer as always is an emphatic yes. The thorny part of your question is the CIO-to-CEO transition. There have been a few high-profile moves to the top position—Jim Rutt at Network Solutions, Tom Thomas at Vantive, Ed Rafter at Prudential—but certainly not very many. In a recent Korn/Ferry-*Financial Times* study on the changing role of the CIO, we asked 340 CIOs in France, Germany, the United Kingdom and the United States if they thought that they could make the move to the corner office. The majority thinks not, but the French and Germans were more optimistic in this regard than were the Brits and Americans. For more on this, see “National Insecurities,” *Trendlines*, CIO, Feb. 1, 1999, or visit www.cio.com.

SIX-MONTH SEARCHER

Q: My current situation is one that I never thought I would encounter. I have a long history of building and managing successful consulting practices either as president or CEO of my own companies or as vice president of professional services for large companies. An accident put me out of business for

six months, and I can't get a spark of interest from any of the people who I have contacted, including Korn/Ferry. I can start up again on my own, but I would rather not go through that again. I have made a lot of money for many people and my track record is great. What am I doing wrong? Is the fact that I am 53 years old working against me?

A: Your six-month respite should not be a critical factor in today's very hot job market, nor should your age. If I take your track record of success at face value, you are probably facing two issues: You are at a very senior level, president-CEO or at least senior VP, and openings at that level are infrequent and highly competitive; and with the Y2K-related hiring frenzy well behind us, much consulting hiring has slowed down. While you continue your search, try doing some subcontract work to get your résumé looking like it's currently employed.

CIOs VERSUS CTOS

Q: I've heard a lot about the CTO position lately. But I always thought that that position's requirements were part of the CIO's job. What are the main differences between a CIO and a CTO position?

A: Well, that will depend on the type of company you are referring to when you ask the question. Most often the chief information officer is one who holds the highest and broadest level of responsibility for the enterprise's information and automation resources and processing requirements, while the chief technology officer, reporting to the CIO, is usually the leading technology strategist and architect for the IT function. Having said that, there are several fine companies, The Thomson Corp. for example, where the CTO title actually represents the CIO function.

Furthermore, companies that are providers of technology generally use the CIO title in the very same way as any other business does—that is, in the context of their own internal informational and processing needs. But, in the world of companies that build and market hardware, software and services, the CTO title is usually reserved for the chief product planning and development individual, perhaps somewhat similar to the old “head of R&D” title. Here the CTO is also very much a technology strategist and architect, but from quite a different perspective. **CIO**

Mark Polansky is a managing director and member of the advanced technology practice in the New York City office of Korn/Ferry International. The web-based Executive Career Counselor column is edited by Web Research Editor Kathleen Kotwica. She can be reached at kkotwica@cio.com.



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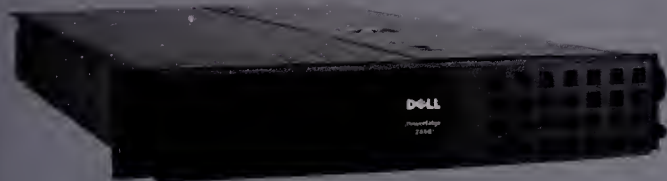


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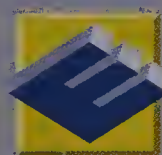
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Total Leadership

Playing Defense

No one is immune to the dangers of an overly political environment. The difference between success and failure is having a solid political defense.

BY CHRISTOPHER HOENIG

IT WILL HAPPEN. Sometime, somewhere in your career, you will find yourself a leader in political hell. In all likelihood, you won't see it coming. It will be more than a simple, transparent office vendetta or confrontation. And although there are an infinite number of variations, it will probably look and feel something like this:

A major systems development project fails, with lots of money wasted. Everyone is tempted to find a scapegoat. Budgets are very tight. Line business units fiercely protect their turf. The CEO has his own new projects to push—all part of a dramatic technical vision—that have little in common with those of the business units. The company either never had a CIO or it hasn't learned to value one as part of the team.

By the way, this is a true story. And it gets worse.

An outside consultant recommends strengthening the CIO function. You are placed in the interim position—pending formal selection of a candidate. After a look under the hood, you find the IT organization has some critical technical and personnel weaknesses, which you have insufficient money to fix. To compensate, you must disappoint both the CEO and the

VPs by eliminating 60 percent of their applications budget.

It doesn't stop there. At least one of your colleagues has it out for you personally and begins to exhibit controlling behavior. You are left out of meetings you previously might have been included in. Your adversary mounts a campaign for a major new expenditure that you know—and he knows you know—will put you on the spot and weaken your position.

All in all, you have both the leadership opportunity of a lifetime and a giant, red bull's-eye plastered on your chest. The question is, how do you survive and succeed?

I've seen and worked through situations like this more than once. Unfortunately, professional competence gets you only so far. The difference between success and failure is having a solid, effective political defense. But before we go into the elements of a defense, it's worth answering one important question. Why is politics so hard for CIOs?



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Total Leadership

The standard explanations include the following: As technical professionals, CIOs are too rigid and rational; they tend to be less effective interpersonally; and the CIO position is at a peculiarly tough vortex of political forces. There is a germ of truth in each of these, but I believe the real answer is simple: Most CIOs just don't try very hard.

Politics and politicians generally get little respect—with good reason. As a result, most CIOs don't embrace the political dimension of leadership. But a good political defense has an

Most CIOs don't embrace the political dimension of leadership.

honorable purpose: It allows you to take risks in difficult situations and do the right thing without suffering unfair consequences. No one in business—or in any other walk of life—is immune to the tyranny, character assassination, manipulation or exploitation of an overly political environment. Every organization gains if its people are strong enough to do the right thing when necessary, not just follow orders or capitulate.

Strategies That Work

One of this century's most infamous American presidents, Richard Nixon, used to say, "Either you're on top of the job, or the job is on top of you." This advice gets at the core of dealing with challenging political situations.

The truth is, much of your fate will be determined before the crisis starts. Either you will be prepared or you won't be. A good defense takes time to build. So even if you aren't being challenged today, make your plan now and prepare. Here's my own personal list of key elements for a bulletproof political defense.

Assess the lay of the land. Make an assessment of the key players and stakes. Try to find out exactly who's doing what to whom and what's at stake. Get help or advice if you need it to step back and figure out the true state of play.

Know your escape routes. It's surprising how often this simple idea is neglected. There's nothing like having enough money in the bank, a network of professional contacts, an up-to-date résumé and standing job offers to give you the confidence, poise and leverage to take on whatever you're confronting.

Know the goals, the games and the culture. Survival requires showing clear connections between everything you do and where the company is going. Moreover, your style needs to fit within limits of accepted culture and behavior. It won't help you to be perceived as "out of bounds" in a tension-filled situation.

Find sponsors and patrons. Build strong relationships, internally and externally, with people who count and have real influ-

ence. This is the network to draw on for help and advice when your moment of crisis comes.

Build a political base. Cultivate allies. The right allies. These can be people you've done things for or who have done things for you. There are times to sow and times to reap in life. Take the time now to sow some seeds.

Strategies That Don't

I've found there are a set of common errors in political defense made by even the most seasoned executives. You can go a long way just by avoiding these classic pitfalls:

Don't focus on politics and forget performance. Overreacting is as big a mistake as underreacting. And don't sink to the level of your opponents. Maintain your integrity at all costs, and concentrate on solving the right problems.

Don't dig a foxhole and get defensive. The paradox of a good defense is that it doesn't look like one. The more you put up walls, the bigger that target on your chest looks. Get out front, stay open and aggressively identify and communicate existing problems to your superiors and colleagues.

Don't squander your political capital. Use it only for the most important fights, where you have a good chance of winning.

Don't knock yourself out. Poor nutrition and lack of sleep can significantly increase your own stress and emotional volatility. The poor judgment and impulsive actions that follow won't help you at all.

Don't sit on your winnings. Being a leader means keeping up with what's going on in the outside world. The most efficient way to stay current is to have a "speed dial list" of outside experts to call in if your political future begins to hang on a technical or management issue where your experience base is weak.

In combination, these dos and don'ts make an ironclad political defense. But you'll never have all of these elements in place, at least not all at once. Sponsors retire, allies turn, objectives change. The base you built a year ago may be worth little tomorrow. So tend your political foundation like you'd tend a garden. A resilient defense needs to be actively managed in response to what's happening in the environment around you.

Odds are, you're a better politician than you think. **CIO**

Christopher Hoenig has been an entrepreneur, government executive (director for information management and technology issues at the GAO) and consultant (McKinsey & Co.), and is author of *The Problem Solver's Guide: Essential Principles for Making Decisions and Getting Results*, to be published October 2000. He is now CEO of Exolve, focusing on next-generation web-based problem solving. Have thoughts on leadership? Please write us at leadership@cio.com.



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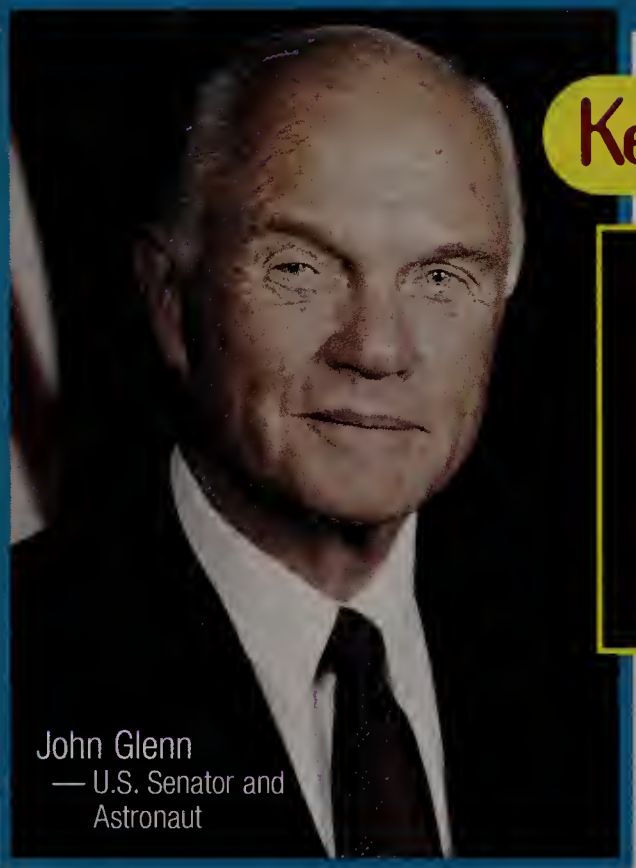
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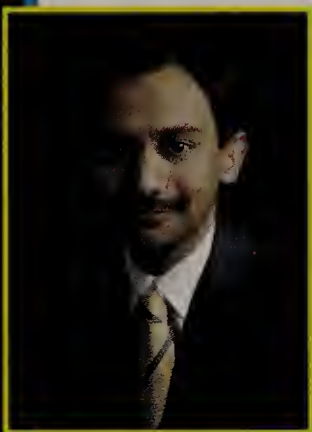
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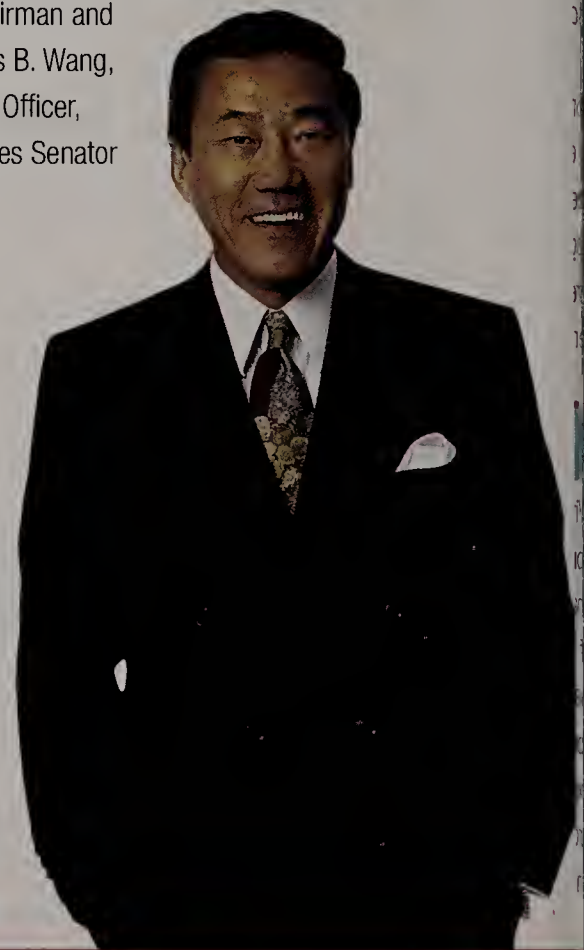


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Cliff Hanger

Can a temporary CIO effect permanent change? Colorado is about to find out.

BY TOM FIELD



Paul Quade knows when his story will end. Just under a year from now, on Feb. 28, 2001, he'll step down from his 18-month term as the state of Colorado's first cabinet-level CIO. And by then, as a direct result of his change leadership efforts, the state's government IT systems will either be more efficient, more effective, more customer-friendly than ever for the state's employees, citizens and businesses—or they won't. It's

as simple as that, and either way Quade's out the door. Problem is, although Quade knows precisely when his story will end, how he gets there is the real trick. And it all hinges on the answer to one key question: Can a temporary CIO effect permanent change?

Read

- ▶ How a tight deadline affects change leadership
- ▶ How to make short-term goals have long-term results

A man in a dark suit, light blue shirt, and patterned tie is sitting on a large, textured rock. He is holding a black laptop on his lap and looking towards the camera with a slight smile. The background is a clear blue sky.

Paul Quade

*CIO, State of Colorado,
on loan from Galileo
International*

Challenge Integrate Colorado's disparate information systems; coordinate efforts among 21 agencies; centralize appropriate service functions; recruit or groom a successor

“At the end of the day, we expect Paul to learn things that he wouldn’t have gotten here.”

—JIM LUBINSKI, EXECUTIVE VICE PRESIDENT OF OPERATIONS, GALILEO INTERNATIONAL

Quick-fix turnarounds and temporary CIOs aren’t new concepts, even in government, but Colorado’s take on them is unique. Not only is the state attempting to reinvent IT operations through a new, central CIO, and not only is Quade, 53, the first person to fill this role. But it’s also Quade’s first CIO job, and he’s doing it as a loaned executive on an 18-month leave from his real job as director of data center planning and engineering at the Denver

office of Galileo International, a Chicago-based travel services provider. The state’s goal is to use Quade’s industry perspective and business best practices to make the most of Colorado’s IT investment. Quade’s challenge, beginning last September, is to be a catalyst for change. He must align 20 disparate state agencies, enable information flow between these agencies and the citizens they serve, consolidate the state’s IT purchases and ser-

vices, and find his own successor. All before Feb. 28, 2001.

“When I first took this job, my wife asked, ‘Why are you doing this?’” Quade says, and he really had to consider his answer. “I certainly didn’t do this for political or career reasons,” he says. In fact, he expresses no desire to parlay this job into a permanent CIO position elsewhere. Instead—and he knows this sounds “mom and apple pie,” but he means it—his main concern is for his adopted home, the state of Colorado. “I want to use my expertise and talents to make Colorado a better place to live and to do business,” Quade says. “Selfishly, I’d like to look back in 10 years and know I helped create changes that made a difference.”

Best-Laid Plans

Seven months ago, Quade was on the outside looking in. As director of technology and planning at Galileo’s global data center in Denver, Quade also served as chair of the state’s Information Management Commission (IMC), a public-private sector group that had been working for several years to help state IT executives understand and implement better business practices. Because of his IMC experience, Quade had firsthand knowledge of the state’s IT organization—or lack thereof. “The state was like a holding company with 20 little companies,” Quade says. In fact, the state had 21 independent agencies, each with its own CIO and significant IT budget. There was no central IT decision making or purchasing. Consequently, each agency developed its own systems, and the state was stuck supporting as many as a half-dozen different hardware, software and network standards, as well as a whopping 72 different IT procurement centers. “Agencies didn’t share information, resources or capabilities,” Quade says. In some cases, the segregated systems were just

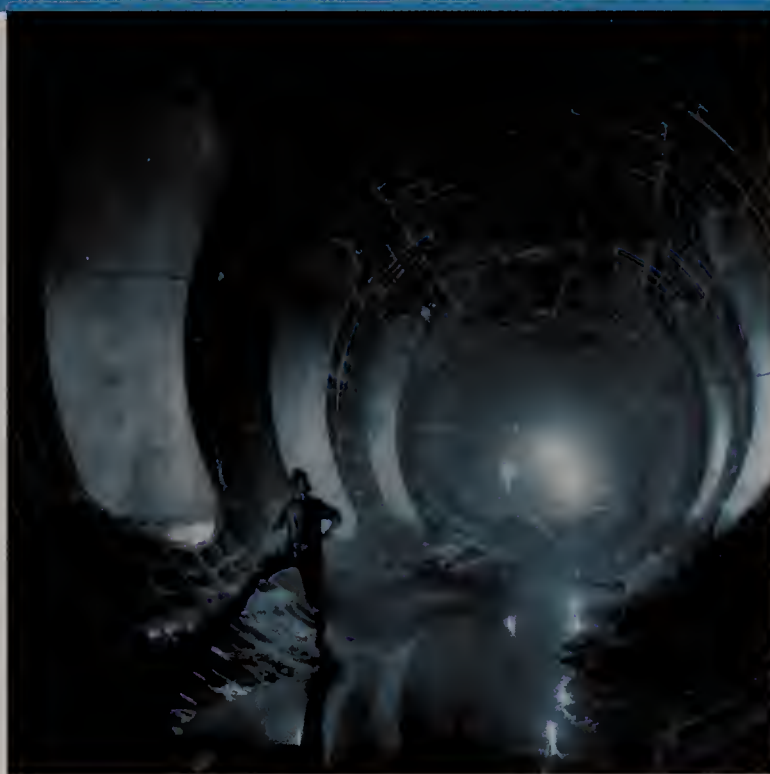


Civic Duty Galileo’s Jim Lubinski lent one of his star employees to the state.

PHOTO BY GEOFFREY WHEELER

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—MARC HOLTZMAN, SECRETARY OF TECHNOLOGY



With people in prison collecting welfare, Colorado had no time to waste Gov. Bill Owens (left), Paul Quade and Secretary of Technology Marc Holtzman.

inefficient—no automated processes for citizens to renew drivers licenses or for businesses to obtain permits. But in other instances the technical shortcomings were embarrassing. "We had people in prison collecting welfare," Quade says.

Since signing on as CIO last September, Quade finds himself on the inside staring at a hard deadline. With the calendar as his guide, Quade has adopted an aggressive project management approach to addressing the state's IT shortcomings. Among his objectives:

Build an intranet. The state had no web-based means for sharing data among its

agencies—never mind citizens and businesses. Yet this turned out to be one of the easiest and most visible changes Quade could initiate. He made it his first objective, due last Dec. 1, and his cross-functional development team actually delivered it three weeks early—a key first win.

Simplify procurement. When Quade took over, Colorado had 72 different procurement centers, and each of the agencies was signing off on its own IT purchases. Quade now signs off on any state IT purchase over \$25,000, and by this month he wants to create a single, web-based procurement center for all IT purchases. The goal here is not just simplification

but to cut the state a better deal by consolidating bulk purchases.

Standardize. Currently, the state has roughly a half-dozen hardware, software, network and e-mail standards. Quade hopes to narrow the options for each standard to two, if not one, by the end of his term.

Centralize. It's unrealistic to think that Quade might centralize all of IT in 18 months, but he does think it's possible to bring together all of the agencies' service arms—network, database and desktop support—in a single help desk office that would serve state government under the terms of service level agreements.



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"He's brought us together not with a gun, but with a carrot."

—HENRY WHARTON, EXECUTIVE CIO OF COLORADO'S DEPARTMENT OF HUMAN SERVICES

Build for the future. In addition to changing how the state manages technology now, Quade has to recruit or groom a successor to replace him. He doesn't know whether the state will hire from within or try to recruit from outside the state, but he does expect to devote considerable time during his last six months to finding a permanent CIO.

The key to pulling off these dramatic changes, Quade says, is to move fast and to avoid insurmountable goals. Complete centralization is one example of a losing proposition—it would require state legislation to create a new IT agency, and Quade doesn't have the time or energy for that battle. Instead, he's focusing on centralizing just the support functions. Outsourcing is another no-win. It would be easy to turn over at least part of the state's IT organization to a technology vendor. But currently, the state has a 1918 law on the books that forbids giving work to a nonstate agency if such a move would result in laying off state employees. Quade already has his hands full battling for his budget; he doesn't want to write new legislation too. And don't look for him to unveil one of these grand DMV automation plans that crashed and burned in California and Washington. "Those are examples of when IT tries to slam-dunk something," Quade says. "Real success takes patience and anticipation." Especially when the clock is ticking.

Why a Temp?

To put it bluntly, Colorado opted for a temporary CIO because the state couldn't afford to hire one of Quade's caliber permanently.

It was just over a year ago that Gov. Bill Owens took office and made IT reform a priority of his administration. Owens' first step was to create an Office of Innovation and Technology, which he appointed Secretary

of Technology Marc Holtzman to oversee. A well-heeled, former investment banker who essentially volunteered for this full-time job (his nominal salary is \$1 per year), Holtzman was charged with crafting an IT strategy for the state and then hiring a central CIO to execute it. But not just any CIO. Owens and Holtzman wanted a top-level executive who knew how to run an IT organization like a business, but who also understood the machinations of government.

Quade's name surfaced immediately. Owens and Holtzman both knew him from the IMC, and they were impressed with his business and technology acumen as well as with the relationships he already had developed with state agency CIOs. They approached him about taking the job, but he declined. He didn't want to switch careers, and frankly the state couldn't even afford to match, never mind top, his Galileo salary.

But then Owens and Holtzman came back with a new idea: What if Quade signed on as a temporary CIO, at his current salary, just to initiate the IT turnaround? Then he could hand over the reins to a successor and return to his old job at Galileo. Quade liked that proposal, so Owens personally called Quade's boss, Jim Lubinski, Galileo's executive vice president of operations, to ask whether he would consider lending out Quade. Hardly a quid pro quo, Owens wanted to borrow Quade for two years, during which Galileo would continue to pay his full salary. In return, Galileo would get...well, basically the satisfaction of being a good corporate citizen.

"My first thought was, 'Why would I want to do this?'" Lubinski recalls. But then he talked to his CEO, James Barlett, who pointed out that the governor doesn't ask for a lot of favors, and perhaps it would be unwise to deny this request. After all, Barlett stressed, Galileo wants to be a long-term player among high-tech employers in Colorado, and how might the company's prospects be colored if executives said no to the governor?

Lubinski couldn't afford to lose Quade for two whole years, so he went back to Owens with a counterproposal: an 18-month loan, during which Galileo would continue to pay Quade's full salary, but only on the condition that Quade work at Galileo for one week per month. Owens accepted, and Lubinski started looking at the scenario as a win-win: the state gets the CIO it needs, while Galileo gets a little PR and a chance to do some succession planning by training people who might eventually fill Quade's shoes. Quade, meanwhile, gets the opportunity to stretch his wings in an entirely new leadership role. "At the end of the day, we expect Paul to learn things that he wouldn't have gotten here, and [lending him out] really is just a good citizen's act," Lubinski says.

Of course, it's noteworthy that, partly as a result of this deal, Owens subsequently appointed Lubinski to the Governor's Commission on Science and Technology. The state also invited Galileo to share critical, real-time data from Colorado's private Y2K command center last Dec. 31—a huge advantage for a business that needed to monitor its global operations. "That alone might have been worth giving up Paul for a year and a half," Lubinski says.

Make or Break IT

There are many good reasons why Quade could fail in his effort to lead change in Colorado. The legislature, for one, has to appropriate the money he needs to complete his projects, and budgetary issues are never a safe bet in government. The agency CIOs are another potential obstacle; without their buy-in, Quade's initiatives will fall flat. And then there are the state's 650 rank-and-file IT employees. What happens if they decide, as state workers can do, to "wait out" the Quade regime—to resist his efforts and just see what the next CIO brings to the table? Quade is well aware of these road hazards, and he's tried to deal with them upfront.

Capitol Gains State agency CIOs Steve McNally (top) and Henry Wharton

Tackling Change

Change leaders tell how to leave a lasting impression

It ain't easy being first. CIO asked three first-time state CIOs—John Kelly of Arizona, Rock Regan of Connecticut and Aldona Valicenti of Kentucky—what advice they had to offer to Colorado CIO Paul Quade.

Manage expectations. When Kelly first took office in Arizona, each state agency had its own notion of IT's purpose. "The larger agencies thought we were going to tell them what to do, while the smaller ones expected we were going to provide more services for them," he says. Kelly had to quickly spell out exactly what IT could—and could not—do.



KELLY

As an appointee of a Republican governor, Quade has enjoyed something of a honeymoon period with the Republican-controlled legislature. But he realizes that situation could change fast, so he's working hard to develop good relationships with key leaders. This—playing politics—is where Quade feels he's challenging himself most.

With the agency CIOs, Quade has tried to ply his team-building skills. He created a CIO Forum of the 21 agency CIOs, who meet as a group every two weeks and in various subcommittees between sessions. In these teams, the CIOs have started to find common ground and tackle common projects—for example, the centralization of services that Quade has proposed. Henry D. Wharton, CIO of the state's Department of Human Services, says he already sees a difference from Quade's team-building. "We're making progress toward sharing information [across the agencies]," Wharton says. "We all see the benefits to be gained by our centralized efforts, and he's brought us together not with a gun, but with a carrot. What we're doing makes sense."

But what happens when Quade's changes actually start affecting people's jobs? That's when the "wait him out" attitude might arise. Quade is concerned that he may end up tan-

Focus on services.

Regan, whose first accomplishment was a state intranet, maintains that internet technologies are the best route to a quick win. "Just throw something out there that the public and legislature can see and get good feedback on," Regan says. "Anytime you can do something to keep [citizens] out of an agency office, that's good."



REGAN

Establish roots. The best way to beat the "short-timer" mentality is to build an IT structure that will outlast the people in charge, says Valicenti, who led a successful effort to change her IT group into a shared services organization. "You have to continually

reinforce that even if you don't [make dramatic changes] someone else will because this is how the market forces are pushing, and they're not going to change."

Don't allow factions. The quickest road to ruin is to allow small groups of direct reports to wander off on their own agendas. "When that happens, it takes the CIO's energy away from the main plan," Valicenti says. And the best way to prevent these factions, says Kelly, is for a CIO to ensure that the direct reports look good to their own peers and personnel.



VALICENTI

—T. Field

gling with the state employee unions, but already the agency CIOs are rallying to his support. "We can't wait him out," says Steven McNally, CIO for Colorado's Department of Labor & Employment. "We can't wait around another two years. The time is now. We can step up and become the automated state we all want to be. But the only way we can be successful in our time here in the state is if Paul is successful in his 18 months."

And then there's Quade's other job. So far, Quade has managed to put in his one week a month at Galileo, and he seems to have a good handle on his staff and projects. But Lubinski is prepared to recall Quade early if there's any sign of slippage at Galileo, and Quade still wonders what will happen when his 18-month stint ends. "I can go back once a month now and get reengaged in the job for a short time. But how will I go back to Galileo and get reengaged full time?" Quade says. "The job will be different, and I'm going to have to fit back into the organization."

So Far, So Good?

Last November, the state went live with its intra-agency intranet—the first tangible evidence of Quade's influence. The fact that he delivered it three weeks earlier than his self-

imposed Dec. 1 deadline shows "hard progress," says McNally from the Dept. of Labor. "The intranet gives Quade the ability to go to the legislature and say, 'Here's what we've accomplished.'"

But now Quade has to ride that success and build on it to achieve his larger goals of standardization and centralization. Which again begs the question: Can a temporary CIO really bring about permanent change in an entrenched state bureaucracy? His bosses think so. "Because the job is new, he's not fighting conventional wisdom," says Secretary of Technology Holtzman. "He's an outsider with a fresh set of eyes," says Lubinski, Quade's boss at Galileo. "He's not beholden to the long-term employment of the state, so he can make recommendations as he sees fit in the best interests of the state."

As for Quade, he's got his plan, his calendar and his mission. Six months down, 12 more to go. He knows when his story will end, but he's still just as anxious as anyone to see how he's going to get there. **CIO**

Could a temporary CIO make permanent changes at your company? Explain why or why not to Senior Editor Tom Field at tfield@cio.com.



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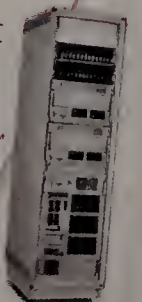


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Let There Be CRM

How this 102-year-old manufacturing company came to see its customers in a whole new light

BY MEG MITCHELL

The Company: Holophane

Founded 1898 **Revenues** \$215 million in 1998 **Location** Columbus, Ohio **Employees** 2,200 total, including 225 field sales reps worldwide and 135 central support staff at corporate office and manufacturing locations **Mission** Selling custom industrial, commercial and roadway lighting products **Customers** Building owners or architects, consulting engineers, contractors, developers **URL** www.holophane.com

IN THE CHILDREN'S PARTY GAME called Telephone, one person whispers a phrase to the next person, who then passes it on, and so on down the line. When the game stops, the phrase usually has become garbled and confused—"My dog has a bone" turns into "My clog answered the phone."

At Holophane Corp., a division of National Service Industries in Columbus, Ohio, things weren't quite that bad. But the manufacturer of customized lighting for industrial, commercial and roadway settings found that the faster

it tried to grow the business, the more frequently orders got mixed up as they traveled from the sales rep to the rest of the company. The 102-year-old company knew that its system of keeping all the information about a project in the hands of the sales representatives would no longer cut it. That's when Holophane turned to a customer relationship management (CRM) system that tied sales-force automation to departments at headquarters like product engineering, customer service and pricing approval.

The Curse of the Manila Folder

Manufacturing industrial-strength lighting products is tricky business—not every roadway or park is the same. So rather than mass producing a few products, Holophane has to build to the exact specifications of each order. Because sales reps are as much consultants as they are order takers, the company's success depends on a knowledgeable group of reps out in the field who follow a project from beginning to end, dealing with the earlier participants—the owners or architects of a building or space—as well as the contractors and distributors who take over after winning the bid for a project.



Holophane's **Gale Ann Kelly** can now handle customer inquiries without tracking down a sales rep, thanks to a CRM initiative spearheaded by **Doug Stang**, director of corporate IT.

Holophane has had sales reps for more than 90 years, and the process for keeping track of a project has been decidedly non-technical the entire time. For each project, reps kept a manila folder in which they collected such information as the customer's history, products the customer was interested in and quotes the sales rep had given. If reps passed any of that information on to the order entry, customer service and billing departments prior to the order placement (and usually they didn't), they faxed handwritten copies. When the order came in from the customer, any department with a question about a project had to track down the sales rep—a difficult proposition with most of them on the road much of the time—or ferret out the answer in some-

one else's files. "The system was so archaic that you'd go to a filing cabinet, pull [a file] out, make copies and give it to the next person. That can be a pretty tedious process," says Steve Ying, a senior sales rep in Houston. Picture trying to get dressed when you have to call different people to find out where each of your socks is.

Without a unified system for tracking what a customer wanted, mix-ups in orders were common. Orders that require human intervention before they can be entered are called dirty orders—and before Holophane implemented CRM more than 50 percent had some speck on them. Maybe an order would say "B" for color. When it arrived at the desk of the order entry people they couldn't be sure if the customer wanted

"We have a better idea of **what** our business is and **where** our business is."

—**DOUG STANG**, DIRECTOR OF CORPORATE I.T., HOLOPHANE

black or blue. They'd have to track down the sales rep and clarify. And if the sales rep had quoted a 10-day lead time, a dirty order might add a day or two to the process. Either Holophane had to eat the cost of expediting the order, or the rep would have to explain to the customer that the order promised in 10 days wouldn't arrive for 11 or 12 days—not exactly the best method of endearing customers to Holophane. In addition, if a rep left the company before completing a project, the project inevitably ran into snags. "We did not have a very effective way to centralize it so that internal departments knew what was happening on projects," says Doug Stang, director of corporate IT for Holophane. That meant that ultimately both the project and the customer suffered.

In late 1996, Holophane executives realized that plans for extensive growth depended on streamlining the ordering process, reducing dirty orders and producing an overall view of the company's activities. They created an evaluation task force made up of middle managers from customer service, engineering, manufacturing, R&D and sales to look into ways to do just that.

A Virtual, Shareable Folder

The task force determined that Holophane needed to revamp its processes and invest in three areas: CRM, sales-based product configuration and the corporate computing infrastructure. To lay the groundwork for CRM and product configuration, the IT department tackled infrastructure first, mov-

ing network systems and hardware into a Microsoft NT environment and increasing e-mail access throughout the company. After examining the offerings of a slew of vendors, the task force settled on a combination of CRM software and product configuration software it dubbed Fusion Business System (see "CRM at Holophane," Page 92). According to Stang, the chosen vendors won Holophane over for three reasons: each offered a strong customizable component with out-of-the-box functionality, a scalable solid architecture and a corporate vision that matched Holophane's. "We looked to see if they were trying to take the products where we were trying to take the company," says Stang.

The two components of Fusion work together in a push and pull model. The CRM software, which Stang's group installed on sales reps' laptops in February 1998, replaces the manila folders of yore. Now sales reps enter all the information about a specific project—the name and history of the customer, the project information and product quotes—into their laptops as soon as they meet with the first contact on a project. It's up to reps to synchronize that information with the main database at headquarters. When they do, the customer service department can see it immediately. If the customer asks a question about the project or decides to place an order later, the information is safely in the database, accessible to all departments—as well as to the reps themselves, should they work with the same customers on future jobs.

In addition to pulling information from the field with greater efficiency and accuracy, Fusion also pushes information about products and prices out to the sales reps. The product configurator, installed in July 1998 and integrated with Holophane's manufacturing system five months later, functions as an electronic catalog. Reps use it to select different parts of an order for the customer, putting together a fixture with the appropriate bulb and cord. In the past, sales people depended on a combination of their own knowledge and the contents of a

paper catalog for details about Holophane products. If a customer wanted fixture X in a voltage or color Holophane didn't make, and the rep didn't catch the discrepancy, the order often went through and eventually turned dirty. Now the configurator checks orders against Holophane's offerings and halts impossible orders before they even leave the field.

EXPERT ANALYSIS BY CASSANDRA MILLHOUSE

Seeing the Light

Holophane understands that better customer relationships don't just happen because you answer the phone quicker in a call center or because you give customers a self-serve website. Better customer relationships are achieved by the whole company working together to give customers what they really want. If customers want speedy delivery, both the fulfillment and customer service departments are responsible for satisfying customers. And if customers want orders filled correctly the first time and every time—a not unreasonable desire!—then everybody in the chain (from salesperson through order fulfillment and delivery to after-sales customer care) must share information.

A central tenet of CRM is that having relationships with customers increases customer retention. It makes sense that Holophane's customers must be happier with a reduction in order errors and faster fulfillment. And we naturally assume that an increase in orders is partly due to happier customers re-ordering from Holophane, where once they might have chosen to go to another supplier.

But it's interesting that Holophane views the benefits in terms of productivity (that is, an increase in volume with the same staff) rather than customer profitability and retention. For example, Holophane has increased order volume; I wonder what percentage of increased orders are from existing customers. If Holophane is not currently measuring these factors then perhaps its next step might be to gather such data. By analyzing customer-centric measurements, Holophane could learn more about customer preferences, which would feed into the product development process and inform its strategy for customer interaction policies and procedures.

Holophane has done well to attack the causes of its operational problems, and while improvements might still be made, has implemented processes and software that encourage better customer relationships, greater productivity and in turn, further growth and expansion. But Holophane cannot afford to bask in the glow of its success without considering strategic aspects that will ensure even greater success in the long term.



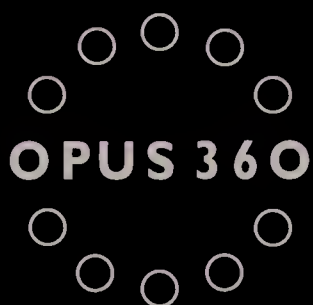
Cassandra Millhouse is a senior analyst at Ovum, a London-based consulting and analysis firm. A specialist in CRM, she is the primary author of Ovum's *CRM Strategies: Technology Choices for the Customer-Focused Business* (1999) and lead analyst of Ovum *Evaluates: CRM in the Front Office* (2000).

A Streamlined Process

Fusion's greatest asset is that it gives Holophane a snapshot of the day-to-day operations. "We have a better idea of what our business is and where our business is," says Stang. And that, in turn, makes for happier customers. For starters, clients who call the customer service center can get immediate answers to questions rather than waiting



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Putting People and Projects Together

for a sales rep to call back. Sales reps spend less time tracking projects manually and returning calls from customers, which leaves them more time for personal service and drumming up new business. "Various customer requests can now be handled much faster since information that used to take days of long-distance phone tag is now at your fingertips at all times," says Ying. The company can monitor which sales relationships actually turn into business, so that reps can give more attention to repeat customers. "Now we can track projects that we've completed anywhere in the world and see what type of lighting equipment was used in each specific project or market," says Stang.

From 1997 to 1999, the company has seen a 15 percent increase in order volume with the same staffing—a sure sign that sales people are spending more time selling and less time sorting out gaffes. And expedited orders are down about 12 percent.

Implementation Challenges

But just because you throw a party and hand out invitations doesn't mean that everyone will come. Early on in Fusion's implementation, sales reps expressed initial reluctance to give up their customer information. "Many reps feared the Big Brother syndrome," says Ying. "There was apprehension about having all your files exposed to management and others throughout the company. And as with all new systems, Fusion's capabilities were limited at first. So there were several functions that were cumbersome or nonexistent."

To combat the uncertainty, Stang initiated an internal PR campaign. Before the system went live, a PR company sent out short e-mails to the sales reps describing potential problems that Fusion would be able to fix. ("Has this ever happened to



"As long as the sales reps dot their I's and cross their T's the system is wonderful."

—GALE ANN KELLY, CUSTOMER SERVICE
COORDINATOR, HOLOPHANE

CRM at Holophane

Objective: To reduce mistakes in order processing, increase efficiency in filling orders and allow sales people to spend more time selling

Process changes: Sales reps are no longer sole keepers of customer information; all project information is now accessible to customer service, product engineering and pricing approval departments; customer service can answer questions at any point in a project without involving the sales rep

Enabling technology: Fusion Business System, which consists of a Pivotal Corp.'s Pivotal solutions CRM software, Commerce Logix's product configurator and a custom-designed connector technology

Scope: 225 field users worldwide and 135 central support staff at corporate office and manufacturing locations

Payoff: Handled 15 percent increase in order volume with same staff; decreased rush orders by 12 percent

you? If you had this great new system it wouldn't!") Holophane also kept a constant newsletter going so that anyone who would be using the system would know how the project was progressing. In addition, Stang broke down the training into small bites—each session focused on only five things—so users didn't get frustrated or overwhelmed. Holophane made processing expense reports mandatory to let users warm up to the system, and after the implementation regional managers kept tabs on users' progress.

Even so, problems crop up. "As long as [the sales reps] dot their I's and cross their T's the system is wonderful," says Gale Ann Kelly, a customer service coordinator who processes

orders for the 23 sales reps on the West Coast. But sometimes reps enter information but forget to sync their databases so that everyone can access them; other times they get frustrated and don't enter the information at all—especially older sales reps who may be reluctant to change the way they've been working for years. Kelly points out that despite the training efforts it's difficult for sales reps to get used to a new system because they work alone and have no one to turn to with questions.

Whatever the hurdles, so far Fusion has been doing itself proud, enabling employees to keep pace with an increase in orders as well as to minimize dirty orders and the costs associated with them. If things keep improving, CRM will likely remain a fixture at Holophane. And in the lighting business, there are worse things to be than a fixture. **CIO**

Do you have an interesting customer-focused case file to share? We'd welcome it. Send your comments and ideas to casefiles@cio.com. Features Editor Meg Mitchell can be reached at mmitchell@cio.com.

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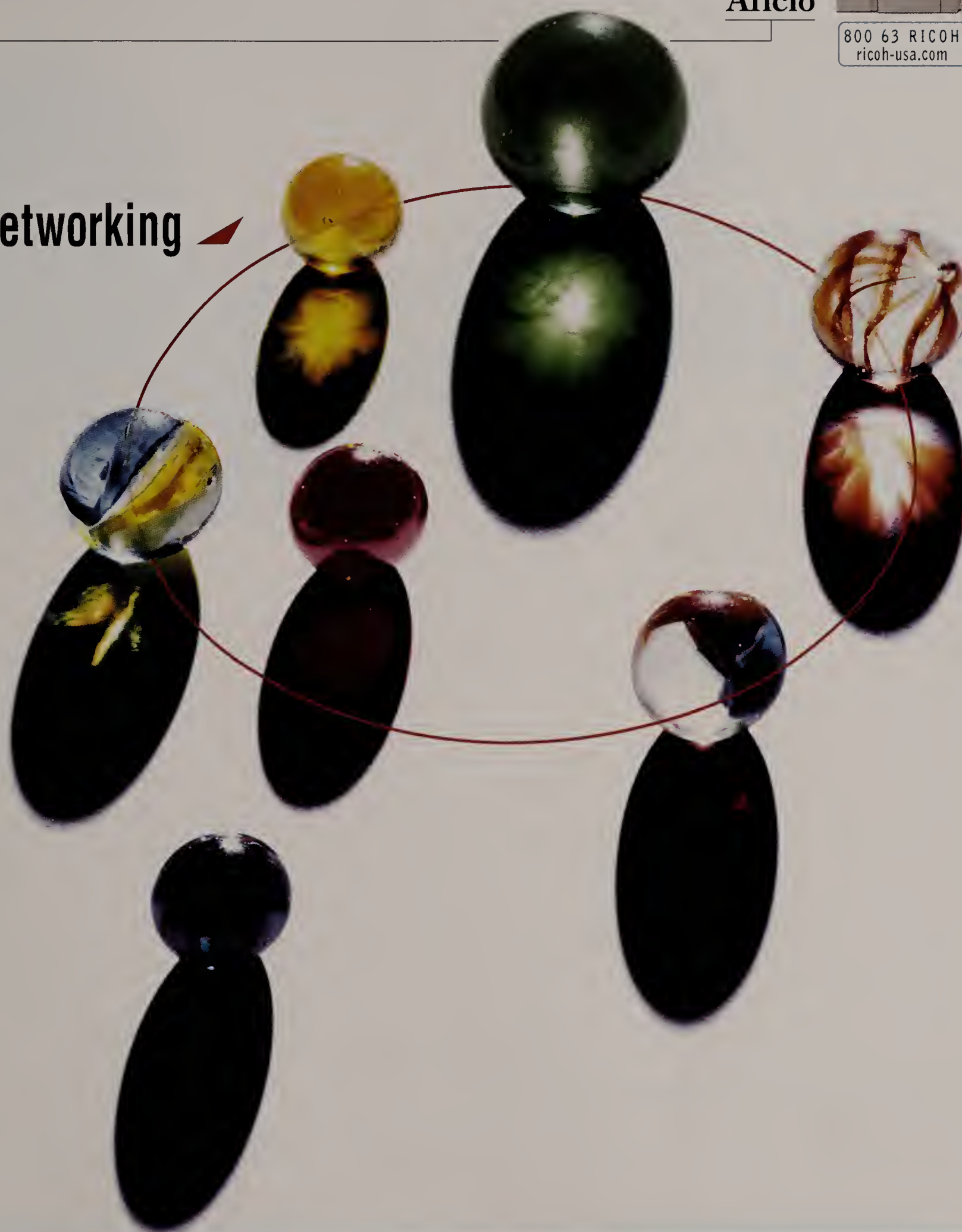
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Certifying skills is gaining ground in IT circles

Paper Chase

even as CIOs debate whether

certifications are worth the paper they are printed on

BY TOM KANESHIGE

In 1997, when Anne Martinez set out to write her book, *Get Certified and Get Ahead* (MacGraw-Hill, 1998), she didn't expect much fanfare. She figured she'd turn an obscure writing assignment into a fast buck or two. "I was just looking for something to write a book about," recalls the soft-spoken Martinez. "The further I went in my research, the more I said to myself, 'Wow!'"

Unknowningly, Martinez had stumbled on the next big technology craze.

Over the next three years, the market for high-tech certifications would swell with more than 400 offerings covering every imaginable job skill tying people with computers. Today certifications roam wild like a sundry herd, ungoverned, ever-populating and kicking up a heap of polemical dust.

Certifications, like college diplomas, presumably prove that the holder has acquired certain knowledge

and levels of competency. Technology certifications are provided by software and hardware vendors, trade schools, nonprofit organizations and even major academic institutions. While some certification bodies offer training and testing, others offer only testing. Certifications cover product expertise such as Windows 2000, IS skills such as networking and broad-based skills such as project management.

But while certifications thunder over the IT range, some CIOs argue that they do little more than drive up payroll budgets already reeling from an IT labor shortage. It's a vicious cycle: Employees demand formal training, receive it, gain expertise that boosts their earning power and then obtain a certification from a third-party organization. Wielding certificates affirming that

Get the lowdown on

- ▶ How companies justify certifications
- ▶ Why some CIOs are wary of certifications
- ▶ Ways to encourage certification training without increasing turnover

PHOTO BY WILL MCINTYRE



**"Technology is flying ahead—and so are
certifications. Employers better find ways
to use certifications to their advantage."**

**—Anne Martinez, author of
*Get Certified and Get Ahead***



“Certification is overhyped. I’ve never paid more money to anybody just because they were certified.”

—Steven Brigham, vice president and CIO, Adaptive Broadband

order to build a competent workforce, it’s mandatory to have defined technical career paths that require certifications,” Glotzbach says.

On the other hand, critics derail certifications by contending that they’re ultimately just pieces of paper and aren’t indicative of real-world job capabilities. Steven P. Brigham, vice president and CIO at Adaptive Broadband, a manufacturer of wireless data networking equipment in Sunnyvale, Calif., claims noncertified people are just as knowledgeable as certified people. “Certification is overhyped,” he says. “I’ve never paid more money to anybody just because they were certified.”

they’ve acquired these new skills, employees then bolt to companies for higher salaries, more training and another certificate. “Technology is flying ahead—and so are certifications,” says Martinez, as she prepares the third edition of her book, planned for release this spring. “Employers better find ways to use certifications to their advantage.” (For more on the certification debate, see “Face Off,” *CIO*, Feb. 15, 2000.)

Certification proponents such as Ed Glotzbach, executive vice president and CIO at SBC Communications, a telecommunications service provider based in San Antonio, insist that certifications provide a path to ensure technology excellence. In other words, those who seek certifications are characteristically more inclined to be flexible or perform better on the job. “In

Brigham isn’t alone in his criticism. Many CIOs refuse to hire “paper MCSEs”—Microsoft-certified systems engineers who lack real-world experience. Microsoft has responded by toughening up its Windows 2000 MCSE track. “We expect candidates to have at least one year of experience implementing and administering a network operating system to successfully pass Windows 2000 MCSE exams,” says a Microsoft spokesperson.

At either rate, certification testing and training doesn’t come cheap. Today a North American company shells out more than \$5,000 for a single employee to become Novell-certified—a sum that includes costs for training, testing, travel and lost employee time on the job.

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More Training, Bigger Payrolls

For employees, the benefits of certification are often readily apparent. After receiving a technology certificate, an employee's salary leaps as high as 25 percent in the first year, say certification proponents. Moreover, *MCP Magazine*, a Microsoft-independent publication for workers skilled in Microsoft products, reports MCSEs earned an average \$76,800 last year, up from \$67,600 in 1997.

Yet faced with these rising costs, employers can still come out ahead. Framingham, Mass.-based IDC found that IS staff holding Microsoft's baseline Microsoft Certified Professional (MCP) certification demonstrated greater productivity at the help desk; companies with MCPs on staff experienced shorter and less frequent server downtime than companies without MCPs, translating into cost savings of over \$2,500 per year per server. For a company with an average of 13 servers, it takes about four months to recoup the costs associated with obtaining MCP certification.

A study conducted by IDC showed that Novell-certified staff increases the productivity and efficiency of the entire company.

Companies with certified staff had a decrease in unscheduled server downtime and an increase in the efficiency and productivity of IS functions resulting in lower help desk costs. As a result, companies with certified staff enjoyed higher perceived qualitative benefits and better staff retention rates. IDC concluded that a Novell-certified employee will bring increased efficiencies to a company year-on-year. That is, of course, if the employee decides to stick around.

Humble Origins

High-tech certification got started in January 1989 when Novell launched its Certified Novell Engineer (CNE) program, thus igniting the then-fledgling computer industry's fixation on credentials. Initially, the CNE program targeted salespeople—not computing professionals. As the certification evolved, along with Novell's growing revenues, the emphasis shifted from sales to technical support.

By creating an army of Novell-savvy engineers throughout the reseller channel and end-user community, the networking company reaped incredible market gains. Novell's success inspired a hoard of stalwart technology companies such as IBM, Cisco Systems and Sun Microsystems to follow suit. The CNE program—which utilizes a network of independent training centers—became the archetype for educating people on both hardware and software products.

Although the vast majority of certification programs are sponsored by vendors and centered on products, another type of certificate is gaining momentum—the vendor-independent certification. Organizations such as the International Information Systems Security Certification Consortium based in Shrewsbury, Mass., which offers the Certified Information Systems Security Professional (CISSP) designation, tests an employee's knowledge in computing areas—not product expertise. CISSP addresses 10 areas of security technology, including access control systems, cryptography and security management practices, and the law.

Also, companies well known in the educational field have begun serving up certification programs. Last year, The Chauncey Group International in Princeton, N.J., a subsidiary of Educational Testing Service, a scholastics-based testing organization that administers the SAT, unveiled an entry-level IT certificate. The certification tests basic knowledge in up to eight career clusters: networking, enter-

Baseline Certifications

Accountants at publicly traded companies are required to have a CPA license. Doctors need an MD to practice medicine. So why not a standard certificate for IT workers?

Trying to close the skills gap, The Chauncey Group International, a testing organization, unveiled an entry-level IT certification program last year. Other groups are forging relationships with academia. The goal is to raise the bar for basic IT computing. "We want to be the worldwide standard for first-year IT professionals," says Lauren Hebert, managing principal at The Chauncey Group International.

Of course, not everyone shares Hebert's enthusiasm. Steven P. Brigham, vice president and CIO at Adaptive Broadband, a Sunnyvale, Calif.-based manufacturer of wireless data networking equipment, believes complex technology disciplines don't lend themselves well to generalizations. "Broad-based certification programs will be watered down too much to give any value," he says.

Anne Martinez, author of *Get Certified and Get Ahead*, claims that a basic IT certificate already exists. It's called a bachelor's degree in computer science and it enjoys universal recognition in the industry. The downside: A bachelor's degree requires an average of four years of study, and by then the technology has changed.

The IT skills gap continues to plague the computing industry, and a standard certification program probably isn't the cure. "Technology is a moving target," says Dror Liwer, chief technology officer at services company Context Integration based in Burlington, Mass. "There's no such thing as a magic bullet."

—T. Kaneshige

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takes in project planning or cost estimation can result in lost revenue. Consequently, the most lofty certification for Context Integration addresses project management skills.

Context Integration's project managers undergo rigorous training, which includes becoming certified at the Project Management Institute (PMI), a nonprofit professional membership organization based in Newtown Square, Pa. PMI offers a certification credential called Project Management Professional (PMP); more than 16,000 people hold the PMP certification worldwide. PMI's main contribution is providing PMPs with a common set of terms and definitions—a de facto project manage-

ment lexicon. All of Context Integration's project managers have taken or plan to take the PMI certification test.

For Context Integration, supporting certification programs such as PMP has paid off. According to Liwer, the company has enjoyed a reduction in inaccurate projections by its project managers. Actual implementations also run smoother, says Leslie Wacker, a senior consultant at Context Integration. Wacker says Fortune 500 companies recognize the PMP designation, thus making it easier for him to work jointly with other project managers at client companies.

Real-World Skills

Project managers with a technology background have become hot commodities in the emerging digital economy as practically every corporation has embarked on a major IT project implementation in the last year. (See "Are Your Project Managers Certifiable?" Page 104.) Gartner Institute, an independent company in Eden Prairie, Minn., started by high-tech market researcher GartnerGroup, recently introduced a project management certificate-based training and testing program aimed at technicians aspiring to become managers. One of the first people to go through the program was Dana Cordasco, a Novell-certified technical analyst at Cahners Travel Group, a Secaucus, N.J.-based magazine publisher. Cordasco, is pursuing both Microsoft's MCSE and Gartner Institute's project management certificates. She believes certificates are her ticket to move into upper management.

In 1997, Cahners Travel Group experienced the pangs of a badly managed project and, as a result, decided to send Cordasco through Gartner Institute's certification program.

Cahners Travel Group needed to convert software and upgrade hardware for 650 employees. Its 10-person IS team

In the past, CIOs have championed certification training and they've been burned—employees spruced up their résumés and left for more money.

International. "Someone with a four-year bachelor's degree in computer science should be able to master this without any additional work."

Training with a Catch

Many CIOs though, remain wary. In the past, they've championed certification training and they've been burned—employees spruced up their résumés and left for more money. The situation has become so critical that some employers offer training only to workers who sign contracts binding them to the company for three months or longer. "It's been going on at a small scale," says Martinez. "I think it's a good idea because it protects the employer's investment."

Even companies that don't back certifications feel that employees should offer certain guarantees in return for other kinds of training. Adaptive Broadband rewards exceptional employees and seeks out others who need further education to hone their skills, with formal training, including the opportunity to pursue an MBA. The decision to pay for training hinges on whether there's a real business benefit for the company. There's also a caveat: Employees must agree to stay with the company for a short predetermined time period or else pay back the cost of the education, says Brigham.

Retaining employees with a ball and chain doesn't make good policy, counters Dror Liwer, chief technology officer at Context Integration, an integrator based in Burlington, Mass. "I thought slavery was abolished a long time ago," he quips. Liwer believes mutual respect between employer and employee is the only defense against worker turnover.

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planned to transition 16 users per day. During rollout, however, the team realized that it had underestimated the time it would take to train people and back up data, yet the team was already committed to its timetables. "We pretty much killed ourselves with the schedule," recalls Cordasco. "At one point, we slept two hours a night for five days in a row."

Afterward, Cahners Travel Group sought to improve its project management competence through certification training. Since Cordasco was the most senior team member—she'd been with the company for three years—Cahners Travel Group sent her through Gartner Institute's project management program. "I was ecstatic about being chosen," she says. "I'm always asking for more training."

In preparation for a written test, Cordasco completed a five-day course in which two instructors led 10 participants in a team-oriented environment. The course material centered on real-world case studies: Students identified favorable project management trends and conducted post-mortem analysis on projects that went badly. The course costs an average of \$3,000

per attendee. After the course, Cordasco concedes that she should have spent more time planning Cahners Travel Group's aforementioned project; she would have recommended transitioning eight users per day instead of 16 users per day.

Cordasco plans to take Gartner Institute's certification test this year. If Cahners Travel Group doesn't have money left in its fiscal training budget, Cordasco says she'll pay the \$150 fee herself. Apparently, it's valuable to have an actual certificate hanging on a cubicle wall; once she secures MCSE and Gartner Institute certificates, Cordasco suspects that headhunters will start calling more often. While Cordasco says she's happy with her current employer and wouldn't leave for a paltry pay hike somewhere else, a big pay hike is another matter. "There are people who left here and are making more money, but I love my boss and coworkers and that's important to me," Cordasco says, adding, "of course, if someone offered me \$20,000 extra, then I'd think about it."

Gartner Institute's testing fee is nominal compared with more established, certification tests. For instance, an applicant at the

Are Your Project Managers Certifiable?

QUICK, what's the hottest nonvendor certificate on the high-tech scene? Answer: Project management certification. Here's a sample of test questions from Gartner Institute, an Eden Prairie, Minn.-based training provider.

1. You've been working on a large IT project for six months. The project is scheduled to be completed in 18 months. Your team has spent \$450,000 out of a total budget of \$2.35 million. Assuming the costs are evenly distributed, what is the current cost variance for the project?

A. 78% B. 42.5% C. 34% D. 23.5%

2. You are an experienced project manager with several successful projects under your belt. On your current project, the following scenarios have occurred. Which one would cause scope creep?

- A. The sponsor requests that a feature be slightly modified to better address end user needs.
- B. A team leader requests that unnecessary preliminary testing be eliminated from the plan.
- C. The marketing director informs you that they have sold the system to six new customers.
- D. The steering committee requests that the system be delivered two weeks ahead of schedule.

3. What are two advantages of bottom-up cost estimates? (Choose two.)

- A. Individual task estimates are very accurate.
- B. The process generates support for the project budget.
- C. Projects do not compete with one another for resources.
- D. They do not require the identification of individual activities.

4. You've been appointed project manager for a very large office automation project. The scope of work and basis of estimate have been completed. You've reviewed the documents and found that there is a critical modification needed in order for the project to integrate with a legacy system. If the modifications are included in the scope document at this early stage, there will be no additional costs, but it will require pushing the delivery date by one month. What should you bring with you when you approach the project sponsors for approval?

- A. Complete scope of work
- B. Basis of estimate
- C. Milestone chart
- D. Alternative plan

ANSWERS: 1. B 2. A 3. A & B 4. D

A + B

= C

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Technical Analyst Dana Cordasco believes certificates are her ticket to move into upper management.

Institute for Certification of Computing Professionals (ICCP), a nonprofit organization based in Des Plaines, Ill., takes three tests—one general test and two specialty tests. Each test costs \$200—a fee that doesn't include test preparation. The tests are also difficult to pass. "Most people must retake at least one exam," says Kewal Dhariwal, international president of ICCP.

Ask the Expert

Have a question about IT certification? You can pose it to **Anne Martinez**, author of *Get Certified and Get Ahead* and founder and editor-in-chief of GoCertify.com, a computer-professional certification site. From now until March 15, Martinez will be available at asktheexpert@cio.com to offer insight on the value of IT professional certification and the need for umbrella certification.

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Since the organization's inception in 1973, more than 55,000 professionals have earned its certificate. About 2,000 people will likely become certified this year. ICCP offers 18 examinations covering such areas as data management, information technology management, internetworking communications theory, microcomputers and networking.

According to Dhariwal, ICCP helps solve a CIO's biggest problem high employee turnover. He claims the typical ICCP applicant is an experienced program ana-

lyst, systems analyst or network analyst, and has been through the revolving employment door. They're seeking career stability and believe the ICCP certificate will provide a stepping stone to senior management. ICCP measures a person's technical and organizational flexibility—a requirement for senior-level management positions, according to Dhariwal. ICCP certificate holders "usually make long-term commitments to their companies," he says.

For every impressive certificate, there are scores of useless ones. The cluttered certification market has many CIOs shaking their heads. In the main though, certificates are good for the industry. For people like Cordasco, certification programs provide an educational path as well as a means of career advancement. Certifications also create a competitive landscape whereby skilled employees can show off their talents.

For many CIOs like SBC's Glotzbach, certificates play a vital role in keeping employees ambitious and excited about their work. Many certificate holders are indeed better prepared on the job. And even Brigham at Adaptive Broadband concedes that certificates help him filter through stacks of résumés. Despite the cost, certification at least provides IT departments with baseline knowledge and skills. "The alternative can be worse," says Andy Sadler, vice president of business development at Global Knowledge Network, a technology training company in Burlington, Mass. "CIOs can choose not to certify people, and these [unmotivated] employees will stay around." **CIO**

Have an opinion about certifying your IT staff? Let Senior Editor Megan Santosus know at msantosus@cio.com.



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WRITING THE BOOK OF LIFE

Researchers worldwide are struggling to sequence the human genome, and their success depends as much on IT as it does on science

BY LOUISE FICKEL

It was early spring in Cambridge, England, in 1953. James Watson and Francis Crick were frantically racing against one of the world's most renowned researchers—Linus Pauling—to determine the chemical structure of DNA. As with many scientific discoveries, everything seemed to fall into place suddenly. "The brightly shining metal plates were then

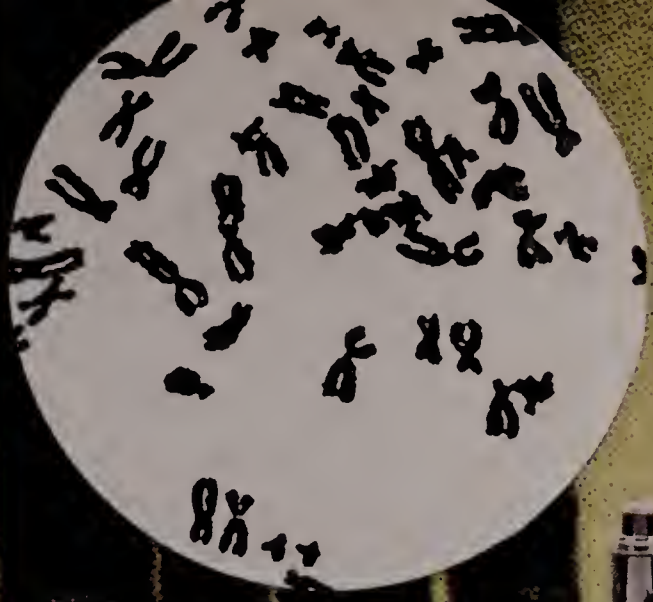
components were present," Watson wrote in *The Double Helix: A Personal Account of the Discovery of the Structure of DNA*. "In about an hour I had arranged the atoms in positions which satisfied both the X-ray data and the laws of stereochemistry."

As you read Watson's elegant description, it's easy to overlook all of the painstaking research that went into the discovery. Yet as any scientist will quickly point out, developing sound theory relies on the meticulous acquisition and analysis of data—in most cases, huge amounts of it.

Learn why

- E-commerce is becoming critical to the genome effort
- Biotech is one of the hottest areas for IT professionals

immediately used to make a model in which for the first time all the DNA



Watson



Crick

That's as true today as it was in 1953. But now scientists are tackling an even grander challenge than the one Watson and Crick faced. Today researchers all over the world are in a quest to unravel one of the greatest scientific mysteries of all time—the genetic code that makes each of us unique, also known as the human genome.

Two key players in this rapidly unfolding drama are the federally funded Human Genome Project and the private company Celera Genomics, and their success may be determined as much by IT as it is by science. Indeed, much of the work behind mapping the sequence of the human genome depends on developing an IT infrastructure that can

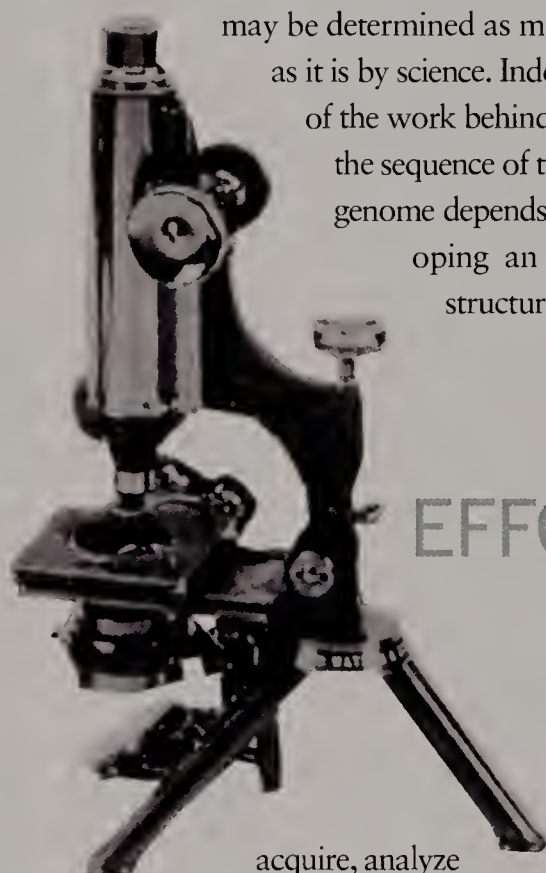
recent article in the *Journal of the American Medical Association*.

Diving into the Data

Work on sequencing the human genome began in earnest in 1990 when the U.S. government launched the Human Genome Project. The goal was to deliver a map of the entire human genome within 15 years. The National Human Genome Research Institute (www.nhgri.nih.gov), which heads up the Human Genome Project for the National Institutes of Health, now says that a working draft will be available this spring. Meanwhile, scientists in six countries—in government organizations, universities and private corporations—are collaborating and tackling different pieces of the sequence.

set up with robots to automate the daily preparation of thousands of DNA samples obtained from anonymously donated specimens of blood and semen. Once the samples are readied, the data is extracted with sophisticated machines known as sequencers. The next step is to convert the data from analog to digital signals for processing by computers. The data is then cleaned up, compared with other known sequence data via standard search algorithms such as Blast (basic local alignment search tool) and then stored in a database.

Then comes one of the biggest challenges: reassembling the data to create a picture of the human genome. Since a sequencer can look at only about 500 bases at a time, the DNA must be assembled—in much the same way that you would try to reassemble



acquire, analyze and store enormous amounts of data quickly and accurately.

The stakes are high. Researchers say that sequencing the human genome will revolutionize health care. Not only will scientists learn more about the origins of certain diseases and why certain people are predisposed to developing them, but pharmaceutical and biotechnology companies will be able to dramatically reduce the amount of time and money needed to develop new drugs. The new drugs, in turn, should cause fewer side effects—a major benefit, given the fact that an estimated 100,000 patients die in U.S. hospitals each year because of adverse reactions to their medications, according to a



The sheer volume of data is staggering: An estimated 3 billion base pairs are what make up the human genome. (In case you've forgotten your genetics, DNA is a double helix containing pairs of the building blocks, or "bases," adenine and thymine, and guanine and cytosine: A-T and G-C). If you find it difficult to visualize this amount of data, imagine reading out loud the base pairs at the rate of 3 per second—without stopping. It would take you more than 10 years to recite all 3 billion pairs of letters, according to the Human Genome Project.

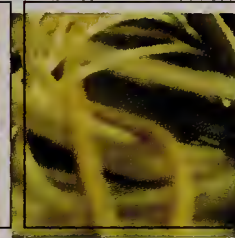
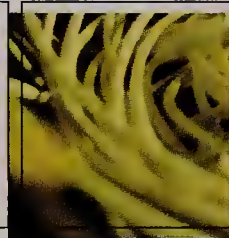
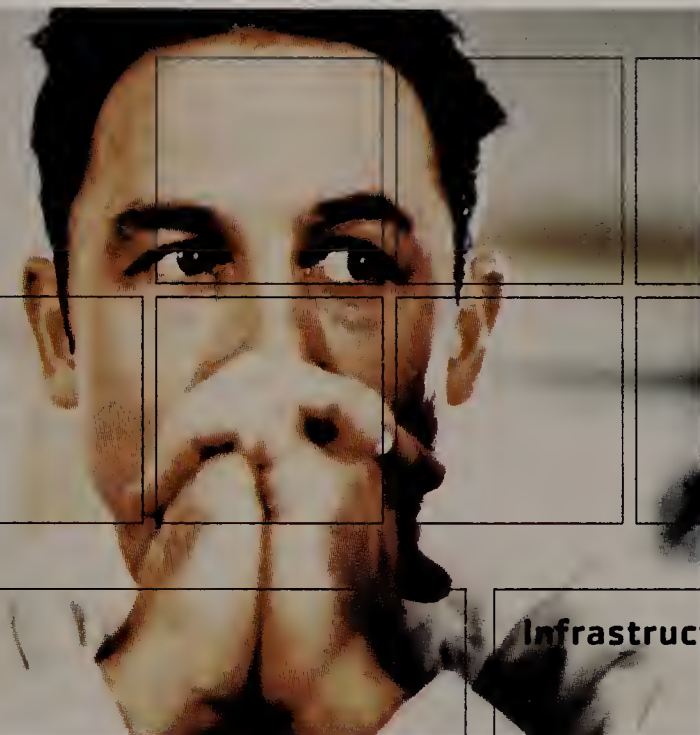
But before scientists can begin looking at the arrangement of the base pairs within the human genome, they need pieces of the genome. So every researcher begins with the same basic series of steps. Laboratories are

numerous Sunday newspapers that have been shredded into thousands of tiny pieces.

Researchers face several key challenges when it comes to working with the data. First, there's the issue of managing it. Not only must they acquire and store the data being pulled from the sequencers, but they must also track data associated with each step of the process (for example, temperature, movement from team A to team B, etc.). It's not uncommon for a lab to process 80,000 samples of DNA each day; that alone translates into about 15GB of sequence data per day. Meanwhile, since the data has such enormous value, it's stored indefinitely. Since many of the applications needed to run a genomics center are either not available commercially or were not designed to handle the huge amounts of data required to map the human genome, IT staff must often

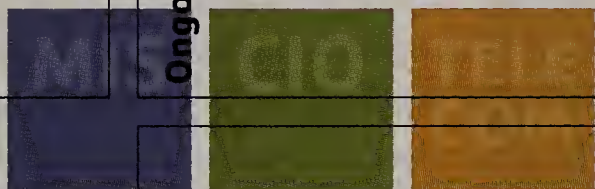
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An Emerging Industry

IT opportunities abound in biological research

BIOINFORMATICS—OR THE APPLICATION OF I.T. TO BIOLOGICAL scientific research—is a rapidly evolving field. Not only are organizations such as the government's Human Genome Project and Celera Genomics developing their own bioinformatics capabilities in-house, but new companies that provide bioinformatics services to companies in the pharmaceutical and biotechnology industries are sprouting up everywhere.

One such company is DoubleTwist (www.doubletwist.com). Founded in 1993 as Pangea Systems by two Stanford University graduate students, the company reinvented itself late last year as an application service provider (ASP). Log on to the company's website and you'll find the tools needed to retrieve and interpret genomic data. You can, for example, compare DNA and protein sequences or monitor the status of sequence patents. Access to basic functionality and research tools is free. More detailed views of data will be determined by a fee structure that DoubleTwist is currently developing.

"The hard thing is processing, interpreting and annotating data, and we're doing all of it on the web," says Robert Williamson, chief operating officer at the Oakland, Calif.-based company. "We're not doing the sequencing. We're simply trying to make all of that data usable. If we're successful, we'll democratize genetic research."

The company has equally lofty business goals. "Now instead of selling to 300 huge companies, I can empower directly scientists worldwide," says CEO John Couch. Couch, who held top-level positions at Apple Computer during its early years, says that this industry reminds him of a different time. "When I looked at our software, I said, 'This is déjà vu.' The internet is equivalent to the microprocessor. I knew that if I could host that environment, the cost would fall dramatically."

Others agree that the field is ripe with opportunities—especially for IT professionals. "This is an extremely hot area," says Ty Rabe, director of Compaq's High Performance Technical Computing Solutions Group in Marlboro, Mass. "We're finding that virtually all pharmaceutical, biotechnology and chemical companies are now creating bioinformatics centers. The field is up for grabs."

And what if you think you might be interested in branching out into bioinformatics? Learn some biology, advises Jill Mesirov, director for bioinformatics and research computing at MIT's Whitehead Institute in Cambridge, Mass. And be prepared to make history. "This whole project will create a new paradigm for biology research," says Mesirov. "I can't repeat often enough how exciting it is to be in this field, in this place, at this time."

—L. Fickel

customize software available in the public sector (e.g., Blast) or develop new applications in-house.

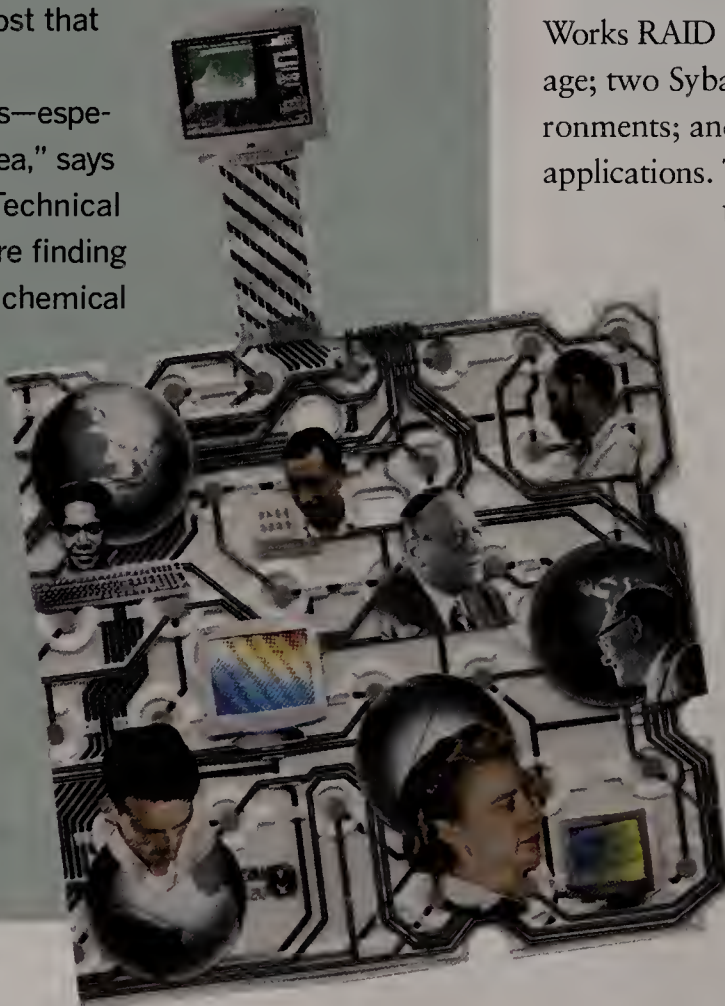
Another challenge involves an issue that most CIOs know all too well: getting heterogeneous applications to talk to one another. Researchers must somehow integrate the applications that ship with the sequencers with their own applications.

Brave New World

Scientists at MIT's Whitehead Institute for Biomedical Research (wi.mit.edu) are spearheading much of the federal effort to sequence the human genome. Led by Eric Lander, the Whitehead/MIT Center for Genome Research in Cambridge, Mass., has assembled an impressive array of staff and technology. The sequencing bioinformatics staff of 18 has a wide range of expertise in such fields as physics, biology, neurobiology and computer science (see "An Emerging Industry," left). Nearly all have some experience with software engineering. Meanwhile, the nine-person computer systems operations staff provides technical and user support.

The list of hardware and software is equally impressive: 123 sequencers; 17 4-processor SMPs are pipeline, assembly, database and file servers; Compaq Storage-Works RAID arrays with 5 terabytes of storage; two Sybase database production environments; and a slew of custom-developed applications. The sequence data is stored in Unix flat files while data gathered by the Center's laboratory management information systems is stored in Sybase relational databases.

Each night the newly assembled sequence data is automatically updated and archived in-house. (Since receiving \$35 million from the National Human Genome Research Institute last March, the Whitehead Institute is scaling up its DNA sequencing from 750 million base pairs per



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year to 17 billion base pairs annually.) The data is also sent via the internet to GenBank, a public database maintained by the National Center for Biotechnology Information (www.ncbi.nlm.nih.gov). (NCBI also develops software tools for analyzing genome data, conducts research in computational biology and distributes biomedical information.) NCBI then duplicates the new data to other public databases in Europe and Japan. The emphasis is clear: make the data available as soon as possible to as many people as possible.

Many of the challenges encountered by researchers at the Whitehead Institute may sound familiar. "We face the same issues that anyone building a large production facility faces—reliability, availability and scale," says Jill Mesirov, director for bioinformatics and research computing. "Biology is very new to production on this kind of scale, so we're constantly talking about the best ways to do this work." Since the amount of data continues to grow at a phenomenal rate, scaling

impossible 10 years ago," says Lauren Linton, codirector of the Whitehead/MIT Center for Genome Research. "When I was in graduate school, we had to call out the [base] letters and write them down. We currently generate about 50 million letters each day. Now the software handles, stores and sifts through all the data."

The Human Genome Project has already made significant progress. Last



November, government scientists announced that they had identified, sequenced and published one-third of the human genome. Less than a month later came another spectacular announcement: the sequencing—for the first time ever—of the DNA of an entire human chromosome.

The Business of Biotech

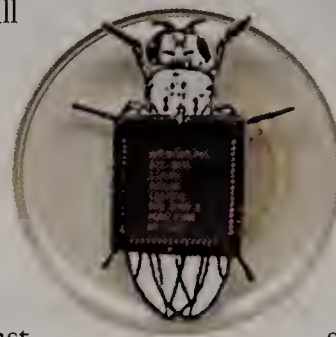
Sequencing the human genome also has a corporate side. Companies such as PE Corp. (www.pe-corp.com) were quick to realize that pharmaceutical companies would be willing to pay handsomely for information

the two groups as a race, others dismiss the notion. In fact, the Human Genome Project and Celera have chosen different approaches to solving the problem—in terms of both science and IT.

At the heart of Celera's approach is a sequencing method that Venter invented. Known as "shotgun sequencing," the approach calls

for blasting the entire genome into small pieces of DNA and then assembling the fragments into the proper order by matching the overlapping sequences at the ends of the fragments. The method is faster than the one used by the federal government—which involves sequencing the entire genome by using one known large fragment at a time—and is controversial, with some researchers concerned that Celera's results will not be accurate.

Since opening its doors, Celera has moved quickly. Venter assembled a team of well-known researchers including Samuel Broder, former director of the National Cancer



Celera says that it will sequence the
HUMAN GENOME FASTER AND MORE
cheaply than the government's
HUMAN GENOME PROJECT.

bility is a moving target. "Our vision of what something will look like in six months often changes," says K.M. Peterson, manager of computer systems operations.

Even with all of the challenges, researchers have been able to scale up production dramatically. "Most of this would have been

that allows them to develop drugs more quickly. PE jumped into the arena two years ago when it convinced Dr. J. Craig Venter to leave his position as president of the non-profit Institute for Genomic Research (www.tigr.org) and launch yet another genomics center—this time, a company called Celera Genomics (www.celera.com). (Venter remains chairman of TIGR's board.)

Celera says that it will sequence the human genome faster and more cheaply than the government's Human Genome Project. While some characterize efforts by

Institute; Nobel Laureate Hamilton Smith, who discovered the Type II restriction enzyme used in gene cloning; and Eugene Myers, who developed the aforementioned Blast bioinformatics algorithm. Last September, Celera announced that it had finished sequencing the genome for *Drosophila melanogaster*, the fruit fly. One month later, the Rockville, Md.-based company announced yet another major milestone: the sequencing and delivery of approximately 1.2 billion base pairs of human DNA to its subscribers. (Celera filed provisional patent applications on 6,500

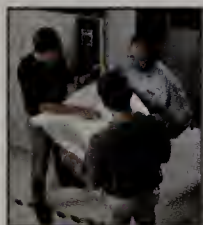
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A Question of Ethics

By patenting the genes it sequences, Celera is causing a stir in the industry

AMONG THE MORE CONTROVERSIAL actions that Celera Genomics has taken is filing for more than 6,000 patents on genes. Patenting those genes will ensure that Celera will have exclusive rights for a certain period of time to develop products based on the discovery of those genes. (Rather than developing new drugs or tests itself, Celera plans to license its intellectual rights to customers such as Pfizer.)

While some view the patenting of genes as immoral and antithetical to research, others see it as a necessity. "Patenting has nothing to do with ethics," says Chuck Ludlam, vice president for government relations at the Biotechnology Industry Organization (www.bio.org) in Washington, D.C. "Patenting confers protection, not ownership. And that protection has a limited use. We need patents to provide an incentive to companies before they will invest hundreds of millions of dollars in developing new products. Otherwise, we won't get them involved."

"I'm not among those who believe that patenting is necessarily a bad idea," says Ronald Green, director of Dartmouth College's Institute for the Study of Applied and Professional Ethics in Hanover, N.H. "However, if companies unreasonably charge for materials they have patents on, they can actually deter other researchers from moving ahead." According to Green, the federal government

should step in and beat the private companies at their own game. "Too often, the federal government gives away its own rights," says Green. "The Human Genome Project should retain patents that will allow them to control utilization and research. That would also ensure that private companies don't reap benefits from federally funded research."

—L. Fickel



of the genes at the same time. See "A Question of Ethics," above.)

Ultimately, Celera wants to become the definitive source of all genomic information by giving subscribers the tools to access and analyze its data via the internet. To meet that goal, Celera has worked closely with Compaq Computer Corp. to develop what company officials refer to as the world's second largest supercomputer facility. It has already installed more than 200 Compaq AlphaServer ES40 systems running 500MHz Alpha processors, 11 GS140 servers and 50

terabytes of StorageWorks storage. On order are an additional 28 ES40s and three WildFires, one with 128GB of RAM. Meanwhile, Celera has also leased 300 3700 DNA sequencers from PE Biosystems. This IT arsenal runs on a switched backbone that supports throughput of 500GB per second.

An E-Business Model

In many ways, Celera's pipeline for acquiring and processing data is similar to that of

the Whitehead Institute. There are, however, several key differences. For one thing, Celera has developed its IT infrastructure with e-commerce in mind. Celera customers, for example, tap into their own databases running on Celera servers via the internet. (Each customer database is updated weekly. Three copies of the data are archived forever on tape.) Celera maintains customer data in more than 60 separate databases.

As the company broadens its subscriber



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base, that model is expected to change. By the end of the year, smaller customers will go to one database where they will access the specific data that interests them. Digital certificates will ensure key information such as identification, access levels and billing. Meanwhile, larger companies will probably continue to have their own databases maintained by Celera.

Celera has signed up four database customers so far: Pharmacia and Upjohn, Amgen, Novartis and Pfizer. The first three ponied up \$5 million for five years to gain early access to Celera's database

tools. Celera also saves customers the time and expense of accessing dozens of databases worldwide. "We are not just a sequence DNA database," says Gilman. "We provide extensive annotation and the best tools for manipulating and analyzing the data."

Because e-commerce is the order of the day, Celera faces certain business pressures. "There's so much data that performance and bandwidth are sometimes an issue," says Marshall Peterson, vice president of infra-

in May 1999 to over 190 by the end of the year. Meanwhile, financial gurus Tom and David Gardner of the personal investment website Motley Fool (www.fool.com) told followers that they plan to invest \$50,000 in the company. And according to biotechnology analyst Eric Schmidt at investment bank S.G. Cowen in New York City, the future looks even brighter. "We think that Celera will win big time because of their dream team, the facilities and their propri-

Customers will gain access to ANNOTATION INFORMATION, COMPARATIVE genomics, Celera's computational facilities AND SOFTWARE TOOLS.



last year. The company refuses to disclose how that fee structure may change as other companies join the fold. Not-for-profit research organizations, however, will be charged less. "We have said that we will charge between \$5,000 and \$20,000 per year per lab for a university," says Paul Gilman, director of policy planning. (The amount per lab will be smaller for universities with more labs.)

And what do customers get for these fees? In addition to access to the actual data, they also gain access to annotation information (for example, details about whether a certain gene has been seen before, whether it has been patented, etc.), comparative genomics (comparisons with the fruit fly and mouse genome), Celera's computational facilities and a wide assortment of software

structure technology. "Customers can either download their tools and data to our servers or they can pull the database to their site. We want to convince them to analyze the data here." Since it's often impossible to predict what customers will need in six months, flexibility is crucial. "We're seeing huge increases

in the numbers and types of customers," says Peterson. "We still don't know how customers will want to access our data in the future, so we want to offer flexibility in terms of billing—whether it's by user, CPU, number of queries or other methods." Flexibility will be especially important as Celera eventually adds data from public databases such as GenBank to its stockpile of information.

Return on Investment

Celera's business model quickly captured the interest of the business world. Wall Street welcomed the new venture with open arms, sending the price of its stock from 14 3/16

etary advantage that will allow them to gain market share," says Schmidt.

Industry observers are also betting on Celera. "There are many companies out there that are sequencing, but Celera is the only one that has tackled the entire genome," says Lynn Arenella, associate professor of biology at Bentley College in Waltham, Mass. Arenella, whose expertise



includes the commercialization of biomedical technologies, believes that Celera has an important edge. "Companies that have the ability to organize and interpret the data will come out on top. Craig Venter is talking about becoming the [Michael] Bloomberg of genetics. And he has always made good on his promises."

It's not clear when Celera or the Human Genome Project will be able to deliver on all of their promises. When they do, however, the results could affect the lives of everyone you know. **CIO**

Louise Fickel is a freelance writer based in Denver. She can be reached at RiceKid@ix.netcom.com.



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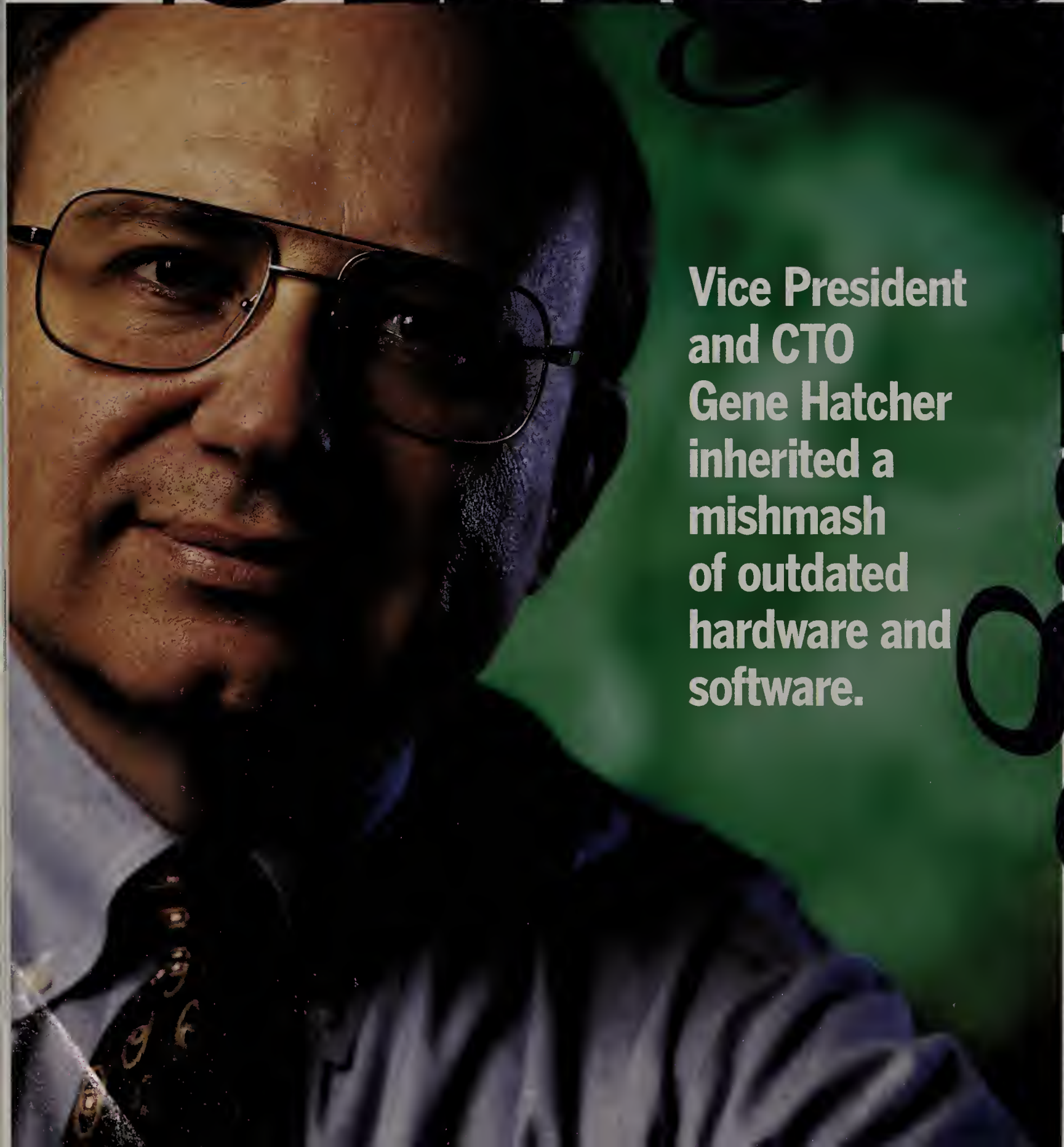
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At this office imaging equipment supplier, a unified IT architecture strategy is laying the foundation for a fiscal turnaround

Single Image

A close-up portrait of Gene Hatcher, a man with glasses and a light beard, wearing a blue shirt and a patterned tie. He is looking slightly to the left of the camera with a neutral expression. The background is a soft, out-of-focus green.

**Vice President
and CTO
Gene Hatcher
inherited a
mishmash
of outdated
hardware and
software.**

BY NICOLE
LEWIS AND
MEGAN
SANTOSUS



WHEN GENE HATCHER joined Danka Business Systems as corporate vice president and CTO in August 1998, the company's IT strategy was nonexistent. Danka, a distributor of office imaging equipment and related services, had a habit of growing by acquisition since its founding in 1977. Along with new business, Danka acquired a mishmash of outdated hardware and software that had to be spun off and integrated into its own architecture by the concrete deadline of Dec. 31, 1998. But a rudderless IT strategy wasn't Danka's only problem. Along with IT, the company's finances were in disarray. By the end of fiscal year 1999, revenues were \$2.9 billion, down from \$3.3 billion for the previous year, and losses amounted to \$295 million. Company executives even entertained the possibility of filing for bankruptcy.

Melding the newly acquired systems with Danka's was just one of the chal-

lenges Hatcher faced. Hatcher was on the job a mere three months when oversight of the IT department was shifted to the CFO. Following the acquisition of Eastman Kodak's office imaging division in 1997, Danka's IT department was split between operations in St. Petersburg, Fla., and Rochester, N.Y.

Consequently, Hatcher had to navigate cultural differences and morale problems. Most of the cultural difference centered around status: the Rochester group comprised consultants and contractors who joined Danka as a result of the acquisition. Hatcher had to simultaneously gain credibility for the IT department, fashion a strategy for moving his department forward and help Danka itself get a handle on its finances.

While not in the clear yet, prospects are looking up for Danka, both in terms of its IT environment and finances. As the

Danka Business Systems

Logistics: Dual headquarters in St. Petersburg, Fla., and London with operations in 30 countries

Line of business: Danka is an international provider of office equipment such as photocopiers, fax machines, and related parts and services

Fiscal year 1999 revenues: \$2.9 billion

Employees: 17,000

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company's first-ever internal executive in charge of IT, Hatcher has instilled a much needed sense of focus and discipline at the global company with dual headquarters in St. Petersburg and London. Now with a unified IT approach in place that includes one database management system, a single internal development environment, centralized IT operations and a common suite of packaged applications, Hatcher is embarking on ambitious strategic projects. "Architecture consolidation is only part of our overall IT strategy," Hatcher says. His main goal is to transform IT into a cost-effective, business-focused service to support a Danka turnaround. Among Hatcher's plans: deploy a web-based sales automation system, develop an e-commerce strategy and put the company's mainframe out to pasture. With earnings from operations in the second quarter, which ended Sept. 30, 1999, of \$36.1 million com-

pared with a loss of \$2.7 million for the second quarter of 1998, Hatcher is on his way to helping Danka turn the corner.

The practice of growing by acquisition caught up with Danka with the purchase of the office imaging arm of Eastman Kodak. While the \$688 million price tag was significant, Danka figured the outlay was worth the corresponding increase in its market presence and customer base. Indeed, buying that division of Eastman Kodak pushed Danka's revenues from \$1.5 billion to more than \$3 billion. Unfortunately, the deal also came with strings that quickly eroded any proposed benefits.

For starters, terms of the sale required Danka to purchase copiers and printers from Eastman Kodak that it couldn't sell. As a result, earnings lagged while inventory levels rose. The deal further strained Danka's finances because of a commitment to more than \$175 mil-



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Merriman,
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lion in research and development costs. Quarter after quarter of revenue declines followed. Within a year, Danka's stock price plummeted from a high of \$42 to \$1.50 per share.

"Suddenly, this major acquisition of the Kodak business propelled Danka into a completely new league, and the cracks showed through very quickly," says David Kendall, Danka's chairman. "There simply were not enough professional managers to handle such a big venture and to build the systems that were necessary to make it function well," Kendall adds.

The IT Strategy

Danka's board responded by bringing in new blood at the top. In August 1998, Brian Merriman, a former executive at Toshiba America Information Systems, was hired as president of Danka Americas, and in July 1999 was promoted to president and COO of Danka Worldwide. In October 1998, Larry Switzer was named CEO following a stint as CFO of Fruit of the Loom.

The new management team formulated a corporate strategy that mandated a reduction in expenses to the tune of more than \$100 million annually. Savings would be achieved through closing and consolidating 60 facilities and cutting the workforce by 1,400. On closer inspection of the company's internal operations, it became readily apparent to both Merriman and Switzer that attention had to be paid to IT. With less than a year and a half to year 2000, Danka hadn't even begun assessing its computer systems for Y2K compliance. But the company had a more pressing deadline: By Dec. 31, 1998, Danka had to separate the newly acquired business from Kodak's corporate systems and integrate it with Danka's IT operations in St. Petersburg.

Danka traditionally relied on outsourced IT management. Hatcher's hiring represented the first time IT was brought in-house. Hatcher, a veteran IT executive whose experience includes posts at Publix Super Markets, Books-A-Million and Richfood Holdings, certainly had his work cut out for him. While stepping into a newly created role is tough for anyone, Hatcher's challenge was all the more difficult given Danka's shaky situation. "The job of CIO was certainly not a coveted position," Hatcher says.

That's an understatement, considering Hatcher's to-do list. As a result of the acquisition, Danka was running a good chunk of its systems on hardware and software run by Kodak, and paying high fees (although Hatcher won't specify them) to do so. "During the transition, we were actually running on Eastman Kodak hardware in

New York, one of our biggest markets," Hatcher explains. Before Hatcher even joined Danka, the company's managers already designed a plan for separating from Kodak, so he had to carry out a strategy that involved moving over some systems with outdated technology.

The three systems brought over from Kodak were sales automation, contracts management and billing, and service dispatch. At the time of the acquisition, management decided to run both the office imaging (OI) division in Rochester and the office products (OP) division in St. Petersburg as they were. From a systems perspective, Hatcher had to separate the service dispatch system from Kodak's operations and convert Danka's divisions to that system. The contracts management and billing system had to be separated from Kodak as well; Danka would then use it in its OI division, which would also use the previous Kodak sales automation system. Both OI and OP would use Danka's corporate financial system.

To accomplish an amicable divorce between the Kodak and Danka systems, Hatcher followed a systematic plan. First, his IT staff integrated Kodak's data with Danka's systems from the OI division via interfaces and rebuilt the data architecture. Next, the staff integrated sales offices and branches by providing access to Danka's voice and data networks. In addition to building interfaces between the new OI systems and the OP systems, the IT group had to build a technical infrastructure to run the OI systems. On top of the technical details, Hatcher had to prepare his Florida staff to operate the new OI systems and train end users how all the systems would work together. All these tasks were completed on schedule.

In place of seven database management systems, Hatcher has implemented a strategy for a single database system from Oracle. Compuware's Uniface is the internal development environment, which will replace six environments. Hatcher will also install a core suite of packaged ERP components that are common across business units.

Once Hatcher completed the Kodak separation, his next big project was getting Danka's worldwide operations ready for Y2K. In February 1999—a start date Switzer admits was a year late—Hatcher earmarked approximately 90 people (out of a total staff of 120) and \$6 million for compliance efforts. By December, the team had successfully met yet another hard and fast deadline. In all, Danka's IT group checked, updated or replaced 9,203 desktops, 414 servers, 314 PBX systems, 307 network routers, one mainframe and 93 major applications that included more than 50 million lines of code.



Despite complex projects, Danka's \$32 million IT budget is down from \$48 million.



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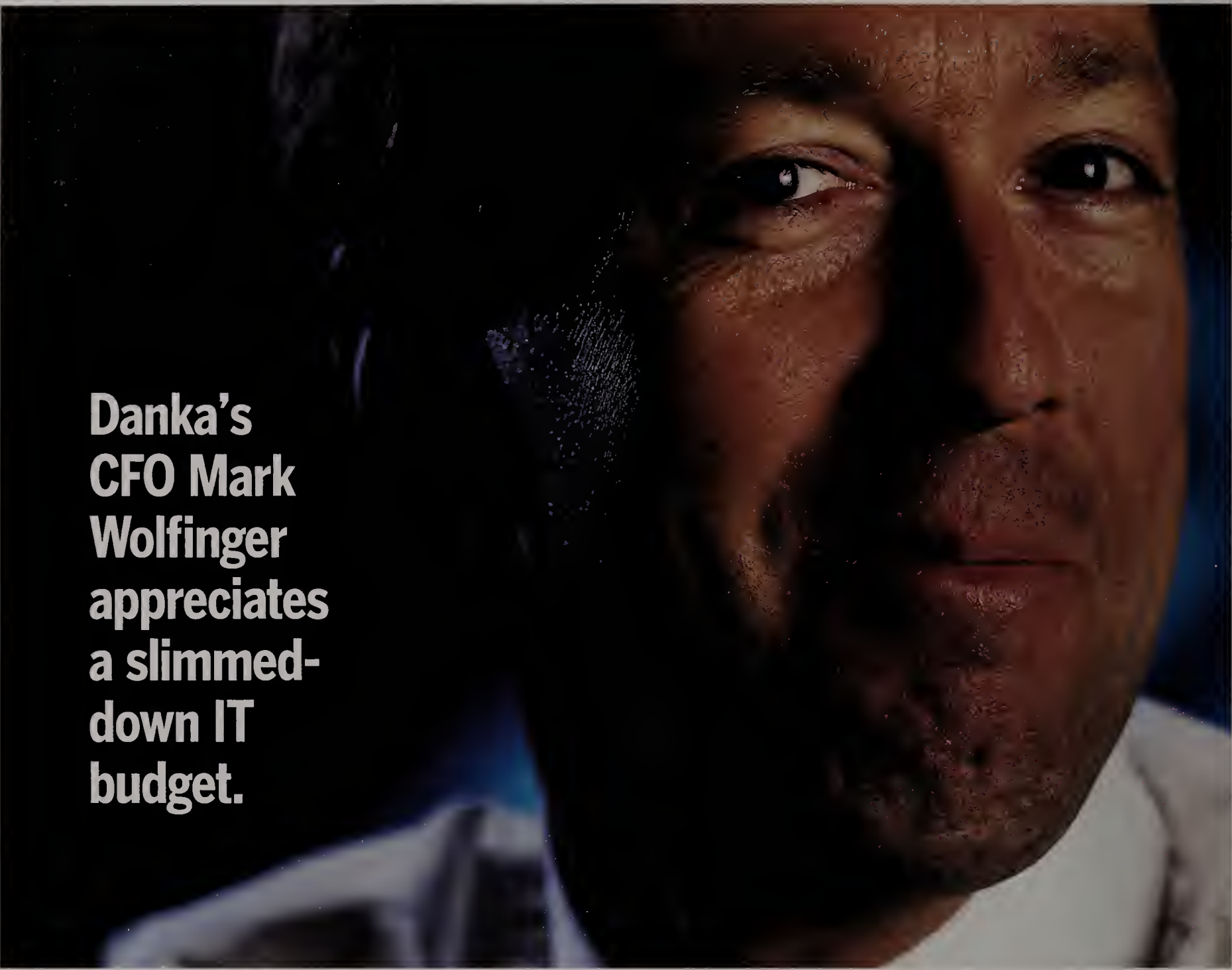


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Danka's CFO Mark Wolfinger appreciates a slimmed- down IT budget.

Successfully pulling off two large-scale projects on time was not lost on Danka's chief executive. "From my standpoint, there simply was not enough time and manpower to do the jobs," says Switzer. "Gene and his people have done a terrific job."

With a track record that solidified his credibility, Hatcher turned his attention to the IT organization itself. He established an IT steering committee made up of senior vice presidents from each of Danka's functional departments along with the COO and the CFO. Hatcher also created the position of manager of information technology (MIT) for each business unit. An MIT, Hatcher says, is a de facto divisional CIO charged with managing the technology on a day-to-day basis.

For a company teetering on the fiscal edge, perhaps Hatcher's most impressive accomplishment thus far has been trimming costs. Despite complex projects, Hatcher has sliced Danka's IT budget from \$48 million to \$32 million. The \$16 million in savings—a welcome addition to Danka's depleted coffers—are a result of reductions in consulting costs and headcount as well as more favorable telecom contracts.

"The reduction in IT spending is critically important," says Mark

Wolfinger, Danka's CFO. "We have to make sure the company runs more efficiently from a cost structure standpoint."

The efforts to turn around the company are cause for cautious optimism among the analyst and investment communities. "I think Danka has turned the corner and has moved away from filing for bankruptcy," says Mercedes Sanchez, vice president and business services outsourcing analyst at Raymond James & Associates, an investment firm based in St. Petersburg. While revenues are moving in the right direction, the company has a debt level of about \$880 million and sales growth has lagged for the past two years. Nevertheless, as of Jan. 18, Danka's stock price closed at \$12.25.

A Man with a Plan

With Danka's IT operations now unencumbered by housecleaning, Hatcher can focus on implementing a wide-reaching strategic plan. With boosting sales a priority, Hatcher is busy working with the sales and marketing department to develop new systems. A virtual private

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Extra Credibility

Gene Hatcher knows what it's like to hit the ground running

When hired in August 1998 as Danka Business Systems' corporate vice president and CTO, Gene Hatcher had little time to waste developing an enterprise IT strategy and establishing credibility among business units reeling from financial disappointment. For other IT executives who find themselves in a similar situation, Hatcher offers the following tips.

At the outset, assess the company in terms of politics, organization and strategy. Carefully look at the technology in place. If the technology is old, can the company live with it? Is there an architecture plan? Answer these questions to get a firm grasp of the situation.

IT can't operate in a vacuum, so it's necessary to get support from the business side. The best way to do this is by involving the business side in plans and decisions so they feel a sense of ownership.

network will enable the company's 1,300 sales agents and 400 support staff to remotely access an intranet for up-to-the-minute sales information. Sales reps routinely fill out as many as 20 forms to complete a sale or lease agreement. A new web-based sales automation system should streamline that process by allowing reps to configure prod-

One strategy for doing this is creating a dotted line reporting relationship between a business unit executive and a member of the IT staff.

Align with key vendors. If the IT department has a three- to five-year strategic plan, make sure key suppliers understand that and buy into it, because it's detrimental to change gears in the middle of projects.

Don't just define a strategy; establish the tactics that will help carry out that strategy. To earn credibility, it's necessary to execute in a way that is consistent with the strategy. For example, one of Hatcher's strategic initiatives called for centralizing all computer operations in St. Petersburg, Fla. The tactics he established to carry out that plan involved hiring adequate staff, implementing disaster recovery plans and building a communication infrastructure. —M. Santosus

keting, Hatcher's focus on sales has taken him pleasantly by surprise. "Through my years in sales and marketing I have never been with a company that had an IS department that was not only sales friendly but was sensitive to the business issues around the sales organization," he observes. "Gene and his organization are sensitive to what the company has to do to grow," he adds.

Of course, not everything Hatcher has done while at Danka has a rosy hue. When he joined the company, one of Hatcher's first tasks was to give 70 contractors their walking papers and cancel a handful of projects already underway. Hatcher describes that day as "the absolute worst day of my professional life, bar none." Now that the IS group is down to 125 members, Hatcher is looking to hire 113 people, not an easy task for an organization with a recent history of layoffs. In addition, Hatcher has to constantly guard against distractions such as requests from business units for pet technology projects that don't have enterprisewide value. And always, the pressure of meeting deadlines. Within 36 months, plans call for a replacing of all major systems.

Still, the prospect of implementing a unified architecture that can help Danka return from the dead keeps Hatcher on track. So does working with an IS group he describes as "loyal, talented, dedicated, hard working and team oriented." Unlike two years ago, Danka now has an IT strategy—and a determined IT leader—in place to guide it in the future. If Hatcher's accomplishments so far are any indication, the IT group will have a big role in Danka's turnaround. **CIO**

Nicole Lewis is a freelance writer based in Miami. Senior Editor Megan Santosus can be reached at santosus@cio.com.

When he joined the company, one of Hatcher's first tasks was to give 70 contractors their walking papers.

ucts and input customer data remotely and on the fly. Testing of the system will continue through April with rollout scheduled for August.

Hatcher's overall vision is to deploy an environment that he calls the virtual global system or VGS. Under the VGS umbrella, Danka's American business systems (including the U.S. and Canada) will all be centrally located in its St. Petersburg office. The centralized approach will support a global marketplace to which Danka's stakeholders—including customers, employees, product suppliers and stockholders—will have access to common information via the web.

According to John Heagney, Danka's senior vice president of mar-

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DEGREES OF HIRE LEARNING

Staffing problem? Here's how to teach your interns well. Problem solved.

BY STEWART DECK

Ryan Burnsides spent the summer of 1998 immersed in video games and got paid for it. He got to live in sunny California, took in a couple of ball games and participated in video game tournaments. One might think that Ryan was getting a free ride from Electronic Arts, the company that foot the bill for his summer adventure, but the company was actually the one that reaped the benefits.

The video game maker, which hired Ryan to work on game design, invests in its internship program and woos its summer interns hoping that they will return for full-time employment after graduation. In this case, the investment paid off for Electronic Arts. "The internship gave me a chance to see what it was like to work at EA," says Burnsides, now a software engineer in the company's Tiburon Studio in Maitland, Fla. "I realized this was what I wanted, a job I could really care about."

Increasingly, companies are turning to interns as a way to entice well-educated, highly skilled students to work for them after graduation. State Street Corp. in Boston, for example, set up its internship program to get a head start on the whopping 4,000 new employees it hires every year. John Fiore, State Street's executive vice president and CIO, says the program provides several benefits to the bank. "We can show potential new hires what kinds of technology they'll be working with and give them some experience using it," he says. "And it's a good way to get good, enthusiastic and dedicated resources focused on a particular need."

Learn how to

- ▶ Run a successful internship program
- ▶ Get the most from your interns
- ▶ Turn high-quality interns into full-time employees

The statistics tell the real story: Fifty-two percent of interns accept full-time jobs at the companies they've interned with, according to a recent poll of 430 National Association of Colleges and Employers member companies. With this in mind, a variety of companies, including IBM, Merrill Lynch and Electronic Arts, have retooled and refined their programs over the past two years to bring in more and higher-quality interns in an effort to recruit future full-time employees.

Many of the big players pour money into their intern programs, recognizing that the payoff will come in easier recruiting and a good reputation. But even small companies can attract highly skilled interns by emulating successful programs already in place at other companies. Such programs provide interns with more than experience and a paycheck. They offer mentoring programs, the opportunity to participate on teams working on live projects, access to upper-level executives and outside activities. And in return, these companies get highly skilled new recruits upon graduation—recruits who are eager to come back to a company that offers cutting-edge technology, a creative working environment and supportive coworkers.

Here's how to get the most out of an internship program.

1 Invest appropriate resources into the program.

Allow room in the budget for an internship program. Whatever a company invests in housing, salaries, after-hours pizza, special programs and group trips will make the program and—more important—the company that much more attractive.

IBM, for example, has several intern programs sprinkled across the country, but one, now heading into its second year, was designed to attract the cream of the crop of U.S. computer science college students. Extreme Blue targets top universities such as Stanford, CalTech and MIT and touts itself as a highly selective program. By going after the best students and offering work with cutting-edge technology, IBM hopes to snag the up-and-coming IT geniuses and to spread the word about the interesting work the company offers.

Last summer IBM spent more than \$300,000 on Extreme Blue. In addition to paying competitive wages, the company paid to bring all 24 students to Boston and sprang for their housing, says Jane Harper, a director of internet technology who oversaw the program. The company also sprang for group outings, a week-

end trip to New York City and some meals.

According to the NACE survey, 33 percent of employers pay to bring their interns to their companies initially, either through plane fares or other travel reimbursement. Several companies go a step beyond that and provide the housing itself. Merrill Lynch, for example, provides housing assistance stipends for several of its summer interns and has worked out a deal with Pace University in Manhattan for summer housing. Electronic Arts, on the other hand, sets up most of its interns with housing in an apartment complex just a bike ride away from its headquarters in Redwood Shores, Calif. The company also reimburses interns who rent bikes for the summer to ride to work.

2 Provide mentors.

Now that the interns have somewhere to live, they need to feel at home in the office. Successful programs pair each intern with a mentor who guides him or her through the first days of work and then serves as a helpful contact throughout the internship. This isn't someone who introduces an intern on his first day and then waves good-bye. A mentor needs to be a friend, a sounding board, a technology guide and possibly even a classroom adviser who helps the intern choose what classes to take when returning to campus.

The Washington Post's systems and engineering department internship program lined up a mentor for Pavel Krapivin, an MIT sophomore majoring in computer science and electrical engineering who did a technical internship last summer. His mentor, Linda Botkin, shared plans and details about upcoming projects and developments and helped make him feel connected to what was happening around him.

"Linda was great," Krapivin says. "I felt like I could ask her anything about the company or about technical things," he adds. "I learned about several different paths to career advancement, learned a lot of details about the work itself that I wouldn't have picked up as quickly [if I had] just observed people working."

IBM's Extreme Blue program assigns each intern a mentor at the start and expects mentors to maintain this personal link by telephone and e-mail after the interns return to school in order

to make the students feel like they're still a part of the company and connected to ongoing project development. "The more the interns feel like they're part of the company, the more likely they'll want to come back and work for IBM full time,"

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says Harper, the program overseer.

Botkin acknowledges that mentoring takes some extra effort but also brings personal rewards. "Working closely with young people is energizing because of the enthusiasm they have," she says. Botkin says she checked in with Krapivin on a daily basis throughout his internship.



A **mentor** needs to be a friend, a sounding board, a technology guide and possibly even a classroom **adviser** who helps the intern choose what classes to take when he **returns** to campus.

3 Provide interesting work on real teams.

Interns are no different from the rest of us: They want to immerse themselves in exciting, emerging technology and work on something real and tangible. "When students weigh internships, they look for projects using some cutting-edge technology that will augment their classroom experiences and give them opportunities to grow," says Judith Mancuso, Carnegie Mellon University's assistant director of employer relations and recruiting.

Regina Dawkins, a college recruiting program manager at Hewlett-Packard and manager of HP's summer internship program, agrees. "Students want to feel like they're making a difference," she says. "So we treat them as employees and give them actual fieldwork." Recent interns at HP have worked

on real projects, such as developing new inkjet printer processes and embedded software applications in HP hardware. "If we just set up administrative-type work for them to do, we wouldn't get a sense of their talents and they wouldn't get a realistic impression of what it's like to work at HP," Dawkins says. What's more, giving interns real work takes

some pressure off full-time staffers. After all, the company hires interns for their brains, not for their alphabetizing skills.

IBM also understands this. It placed several of its Extreme Blue interns on a team developing advanced internet messaging technology, while others got to roll up their sleeves and dig into some JavaBeans development. Software maker Adobe Systems' 2-year-old intern program in San Jose, Calif., sprinkles its 30 summer interns across seasoned teams that work on a variety of software developments, including refining features, script testing and quality assurance testing. Merrill Lynch's IT interns worked on projects ranging from supporting the ML Direct website to a Blackberry wireless e-mail device project to intranet page creation.

"Students respond well when they feel like they're part of something bigger and when they can see that what they're doing has a tangible benefit to the company," says Natalie Lundsteen, the Internship

Coordinator at Stanford University's Career Development Center.

Electronic Arts doesn't fool around when it comes time to assign jobs to interns. "We get them working quickly on pieces with easy ramp-ups so that they don't have to read pages and pages of manuals before they can actually get to work," says Kim Capps, university relations manager at Electronic Arts, developer of such popular video games as "Knockout Kings" boxing, "Madden Football" and "Tiger Woods Golf." "That gets them incorporated into their teams quickly and gives managers a way to judge their advanced skills. But no one gets pampered; everyone gets up to speed and gets going," she says.

"Students also want to be able to come back to campus in the fall and brag a little about what technologies they've worked on," says Mancuso. Recently, bragging rights have

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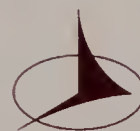
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gone to Carnegie Mellon students who have worked on high-level web development, data mining and data retrieval projects, she says.

All work and no play, however, will make for a dull internship, so plan some fun outings for these folks. Spring for tickets to a ball game or a concert or a big show. Take them white-water rafting or hiking or get them together for a trip to a demolition derby. Find ways to make sure they're having some fun.

4 Expose interns to other business functions and executives.

Merely putting interns on teams and giving them interesting projects isn't enough to guarantee success. Internship programs should also provide lunchtime company speakers, technology seminars and access to company executives to round out the experience.

At IBM and Merrill Lynch, executives from all business divisions, from the chief technical officer on down, attend lunchtime sessions with interns to discuss their companies' technology directions and to explain the role that IT will play in current developments throughout the company. Interns should also be encouraged to set up informational interviews with various business executives in the company, giving them the opportunity to talk to people outside their workgroups and to gain a sense of what skills they might need to develop in order to work with those divisions.

At Electronic Arts, the summer interns get together at the beginning of their internship to come up with their own idea for a video game. At midday sessions throughout the summer, representatives from different departments such as legal, graphics, and sales and marketing meet with the interns to explain the role they would play in bringing that game to market. At the end of the summer, Electronic Arts' CEO comes in and tells them why the group's idea would or wouldn't be put into production.

Internship programs should also provide lunchtime company speakers, technology seminars and access to **company executives** to round out the experience.

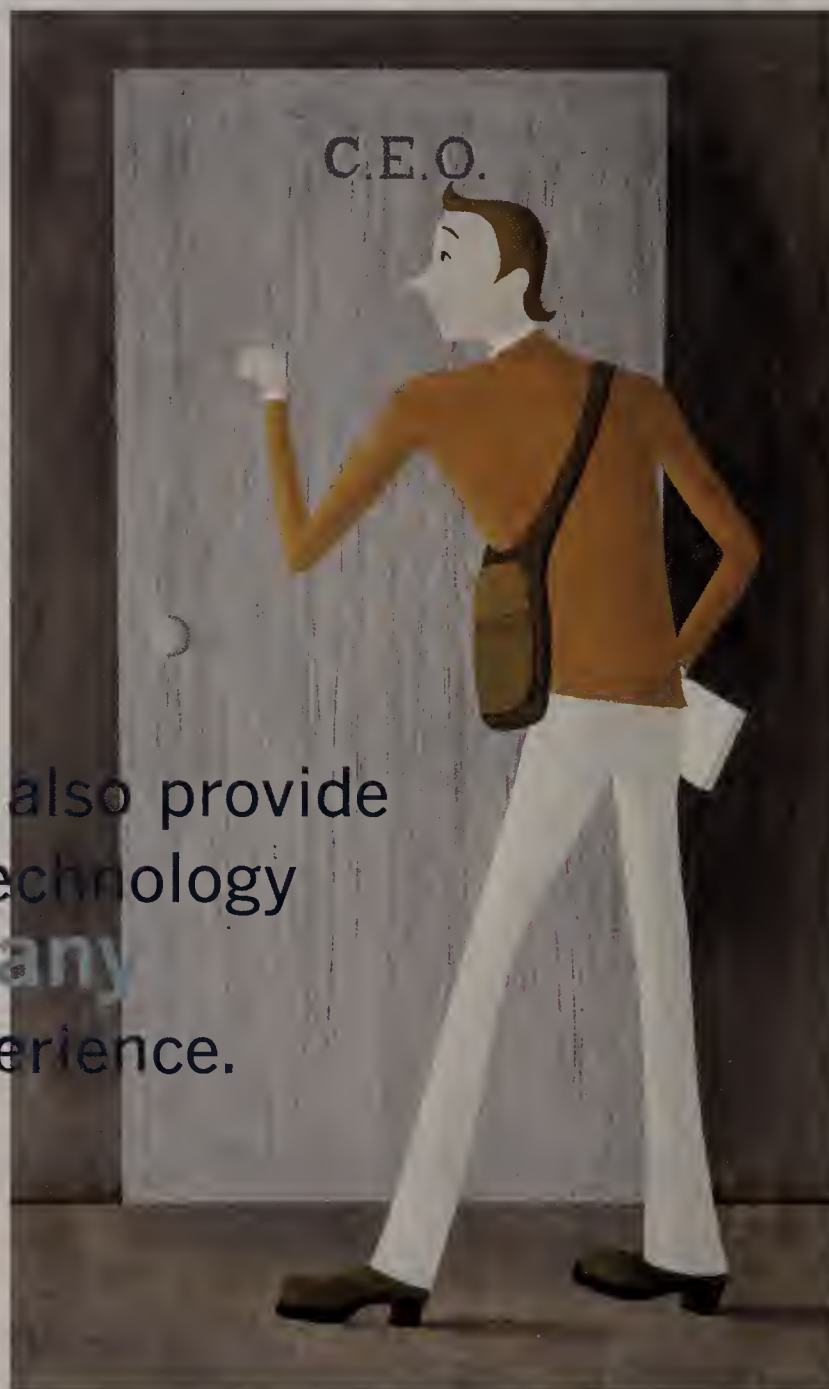
Although *The Washington Post's* systems and engineering department internship program is small and takes on only five students in the summer, it is known for giving its interns a lot of freedom and autonomy. Krapivin, the MIT student who interned at *The Post* last summer, says that having access to people outside his department was particularly useful. "I inter-

viewed several company super-users and gained a better understanding of how organizations function and depend on IT," he says. "I had access to all the technology there," he adds. "I could pretty much go wherever I wanted and ask about anything. It was pretty insane."

5 Recession-proof the internship program.

Once a company has started an internship program, it should work to make sure it doesn't get cut from the budget during lean times. If it does, it will likely take twice the effort to restart. To ensure the longevity of the program, talk it up with the right executives, show off interns' work and demonstrate in hard numbers how the program facilitates the hiring process and saves money on recruitment.

HP's Dawkins makes a point of publicizing the success of her company's internship program to higher-ups through formal, written reports as well as through informal ways that highlight how successful HP employees often got their start as HP interns. "Our conversion rate [of interns to full-time employees]



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These Kids Are Certified

The CIO of Contra Costa County turned to specially trained high school students to address its staffing shortage

STEVEN A. STEINBRECHER, CIO OF CALIFORNIA'S CONTRA COSTA County, doesn't spend a lot of time trolling for new IT recruits. But with an IT budget of \$25 million and an IT infrastructure staff of only 100 to 125, he needs all the help he can get.

"We're like a compressed multinational company," he explains. "This county has 40 different business units, including a hospital and a jail. We run the elections and manage all the child and welfare support checks for the sixth-largest county in the state of California."

Three years ago, Steinbrecher took what some might consider a drastic measure to address his staffing shortage: He began taking on high school students as interns. Not just any high schoolers, though: specially trained students who had gone through Cisco Systems' "Cisco Kids" (Cisco Academy) program, a two-year, four-semester-based certification program. "These kids push my old-timers," says Steinbrecher. "They're eager, tenacious and smart."

For some of the interns, this is their first real, paid work, so Steinbrecher buddies them up with an adult. "Some are very bright—one is so bright he even showed IBM reps a thing or two about [IBM] thin client NetStations that they didn't know themselves—but some have few social skills. We try to help them with that too."

Steinbrecher also counsels his interns about what more they can do beyond getting paid well to configure routers. "We try to show them that they might not want to be doing low-level stuff forever; that the only way to get into management is to go on to college," he says.

Several high school interns who've worked for Contra Costa County come back to work there during school breaks and the summer. And what about after college? "Oh yeah, we hope we get 'em all back after they finish college," says Steinbrecher.

—S. Deck

(FOR MORE ABOUT STEINBRECHER, SEE "CONTRA COSTA COUNTY'S STEVE STEINBRECHER," CIO, DEC. 15, 1997/JAN. 1, 1998.)

is more than 50 percent and rising. This alone demonstrates how important it is to our recruitment efforts," says Dawkins.

At Electronic Arts, Kim Capps boasts of a 30 percent conversion rate. "Our program is absolutely justifying itself," she says. "It helps us ship products on time and we've had 20—and counting—full-time hires from it in just two years. In addition, 26 percent of the summer 1999 interns have accepted a full-time job at the company after graduation this year.

As a way to showcase interns' work, Electronic Arts adds their names to the video game creative team credits. By doing so, the interns not only have something real to show for their summer work, but others in the company can see that these energetic summer workers played a part in producing the final product.

6

Monitor interns' satisfaction with the program.

Last but not least, ask interns how their experiences are shaping up. Doing that after the internship is over is necessary, but successful programs do it along the way too. Mentors should seek feedback from their interns on an ongoing basis and report that information back to the program coordinator. Feedback from interns is also critical to improving programs; nothing gets swept under the rug, and fabulous methods and experiences are spotlighted.

A good internship program will also pay off in ways one might not expect. Students return to campuses with tales of the interesting and fun work they've just done for fascinating companies, encouraging their friends and peers to consider working there. "It's good PR," agrees Jeanne Koch, the systems manager who coordinates recruiting and training for *The Washington Post's* systems and engineering department. "It gets our name out there in the marketplace. Students who've had a good experience go back to campus and tell their friends about us."

But bad experiences work the same way, only more rapidly. Word of one bad internship will spread like the flu in a windowless office building. "If students have a dull or bad intern experience, they'll go back to campus, get on the internet and start talking about it," says H. Michael Boyd, a program manager in human resourcing strategies research at International Data Corp. in Framingham, Mass. "Bad programs can collapse completely under the weight of bad publicity."

Some college career offices even reprimand summer employers if students complain of boring internships with absentee bosses who pass off only periodic busy-work. Be assured that if college career offices know of a company's miserable program, hundreds of students have already been tipped off. And there's nothing like a company's bad reputation to send smart, eager and talented students running in the other direction.

"Internships are the way to sow the seeds for future recruitment," concludes Barbara Gomolski, research director at Eden Prairie, Minn.-based Gartner Institute, a company started by Gartner Group. "If you give interns challenging work on high-level technologies, get them involved in the business and give them people they can look up to, you can entice them to work for you," she says.

In a competitive marketplace, that's quite a payoff. **CIO**

Staff writer Stewart Deck would love to hear other interesting internship and first-job stories. Contact him at sdeck@cio.com with your tales of early adventure.

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REENGINEERING redux

The reengineering battle cry of the early '80s, "Don't automate, obliterate!" called for companies to tear apart the ways they worked and redesign using a clean sheet of paper.

The movement gained a frantic following but few success stories. Most reengineering efforts floundered or degenerated into wholesale layoffs. The bad ways of doing things remained, with fewer people to do them. It took ERP software to rescue reengineering from the catch basin, forcing companies to define and redesign workflows to fit the new software so that the different areas of a company could communicate and cooperate.

Now the headlong rush to e-business is bringing us back to the reengineering bowl for another dip. This time, we should raise our heads and look outside the company, to our customers, partners and suppliers, and reengineer our processes into one great, efficient, internet-enabled whole, says Michael Hammer, reengineering's original pulpit-thumping guru.

In "*The Process Starts Here*," Page 144, Hammer and five information executives debate the future of reengineering. In "*Practice Makes Process*," Page 158, a new book urges us not to forget the people who have to work in our reengineered shops. And on Page 166, Hammer responds.

THE PROCESS starts HERE

What is a business process anyway?

The official Hammer definition: an organized group of related activities that together create value.

Last fall we brought together a stellar panel of CIOs and business executives to toss Michael Hammer's theories against the wall to see if they'd stick. Along with CIO Executive Editor of Investigations Christopher Koch, the participants included John Glaser of Partners HealthCare System, David Lingren from CheMatch.com, Bud Mathaisel of Solectron, and Visa USA's Carl Pascarella and Scott Thompson.

For the last decade, Hammer, equal parts Borscht Belt comic and austere academic, co-author of *Reengineering the Corporation* (1991), has been thundering at Fortune 500 managers in his \$1,000-a-head reengineering revival meetings, exhorting them to eliminate all work that does not add value to the customer. Sounds great, but keeping the faith in the real world remains a challenge.



MICHAEL HAMMER: "Companies are doing less and less but doing it better and better."

The Process Pilgrims

Bud Mathaisel, corporate vice president and CIO, Solectron, an electronics manufacturing services company in Milpitas, Calif.

Process challenge: As a maker of the components, such as printed circuit boards, that are at the heart of cell phones, PCs and other electronic products, Solectron must constantly improve the speed and costs of its manufacturing processes to keep its name-brand electronics clientele from bolting to one of its competitors.

David Lingren, managing director of information technology, CheMatch.com, an online trading system for buying and selling bulk commodity chemicals based in Houston.

Process challenge: To continue to build its online trading community, CheMatch.com must develop value-added processes—

such as personalized customer service—that set it apart from a standard commodities exchange.

Carl Pascarella, president and CEO, and **Scott Thompson**, executive vice president of systems development, Visa USA, a payment card company based in Foster City, Calif.

Process challenge: Using Visa's expertise in credit card operations to create new payment processes on the web.

John Glaser, vice president and CIO, Partners HealthCare System, a corporation of affiliated hospitals in the Boston area.

Process challenge: Trying to extend its processes outside the hospital walls to support patients who have long-term diseases.

Hammer: Let's discuss where the concept of process stands in your companies today.

Mathaisel: It isn't as though we were asleep and didn't understand process before reengineering came along. It's that we didn't have the systems interoperability and the universal standards like the internet, nor did we have the customer drivers that warranted us doing this sooner.

Solectron has what we call our value-chain model, which includes five processes: build to order, configure to order, customer relationship, materials management and new product design. So process is very much alive at our company. It's being driven by the e-business initiatives today as much as it was driven by internal efficiencies within an enterprise in the past.

Hammer: Bud makes an important point. The focus on process is something that perhaps at some deep level we'd always wanted to do but didn't have the wherewithal. It's only as the interoperability of systems allows us to break down the barriers between functions that it becomes something that we can even hope to do.

The next barrier is the intercorporate barrier. That's being broken by internet-related technologies, and that's allowing us to extend our processes even further.

Lingren: I think you really hit one of the key things, which is processes among or between

organizations. We are a very small company. Our internal processes are embryonic where they exist at all. Connecting with our trading partners and their internal processes is one of our main focuses.

Pascarella: Visa is at the apex of a number of fairly substantial changes. Five years ago, 15 or so banks contributed about 50 percent of our business revenue. Today that business is in about five or six banks. Whenever you have that kind of consolidation, you have to manage your business differently.

We have also moved from traditional credit cards, which didn't require that we have a direct relationship with banks, to total relationship-based products such as checking cards that access a bank's accounts directly. So now we are working much more closely with our banking partners.

Electronic commerce has also had a phenomenal impact on us. It is moving so quickly that we decided to take all the e-commerce functions out of the various lines of business and put them in an entirely new organization, called E-Visa. Then we set up a different governance system for it. Instead of having our board of directors or a subcommittee govern this very important side of the business, we went to Silicon Valley—to companies like Sun Microsystems, Yahoo, Intel and some of the online merchants—to be part of an advisory board

with some of my member bank directors to really start positioning this business unit in an entirely different way.

Glaser: We have financial processes to make sure that a claim has all the data that it needs to be paid. We also have administrative processes associated with the procurement and use of medical supplies. But the core of what we spend our time on, of course, are the processes used to treat diseases.

Many of the diseases we deal with are long term—perhaps affecting the rest of a person's life. Managing a disease over the long term can involve dozens of providers that may have a common interest in that patient, with no other legal or contractual binding between them. We're examining ways to keep the person with congestive heart failure out of the hospital and enable him to maintain a life that is as good as we can make it.

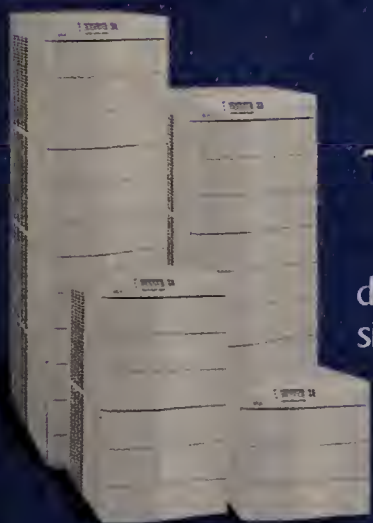
CIO: What's in it for Partners to manage health-care processes outside hospital walls? Is it cost reduction? Is it customer satisfaction? What are the motivators?

Glaser: It varies by the type of patient. In pediatrics, by and large it is customer satisfaction—knowing that Moms and Dads like the comprehensiveness of care and are likely to return.

In other cases, it really is a cost question and a reimbursement question. An insurance



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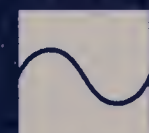
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JOHN GLASER: "The core of what we spend our time on, of course, are the processes used to treat diseases."

company may say, "I'm going to give you 100,000 people. Take care of everything that goes on with them, and I'll give you a certain amount per month to do so." Then we have great incentive to look at the processes across this set of patients, across long periods of time, in a range of diseases and find ways to keep them healthy and out of the hospital.

On the other hand, if the insurance company decides to pay us for each visit, we have much less incentive to worry about the optimization of a series of visits. So it's a mixed

set of motives and one of the challenges hospitals have is that all of these motives are at play at the same time.

Customers Ganging Up

Hammer: To Carl's point about consolidation and the need to partner more with customers, one of the universal phenomena I've seen in companies recently is that you all probably have fewer customers. Consequently, they have greater power, whether that is because they are going through mergers and acquisitions or because they are banding together in groups. Stronger customers create a greater emphasis on operating performance because they demand it.

That's one of the drivers behind process.

Lingren: We really face this partnership issue in at least two different ways. We are sort of a third party, and a lot of what we do is organize around facilitating and supporting partnerships or processes among our customers. In other words, we don't buy or sell chemicals but we support a place where buyers and sellers can come together. We are independent of them, and we have to infer a lot of their processes by indirect observation and by trying to encourage them to make changes in the way they work today.

On a second dimension, the activities that we support are very complicated and involve a lot of different facets. There is the buying

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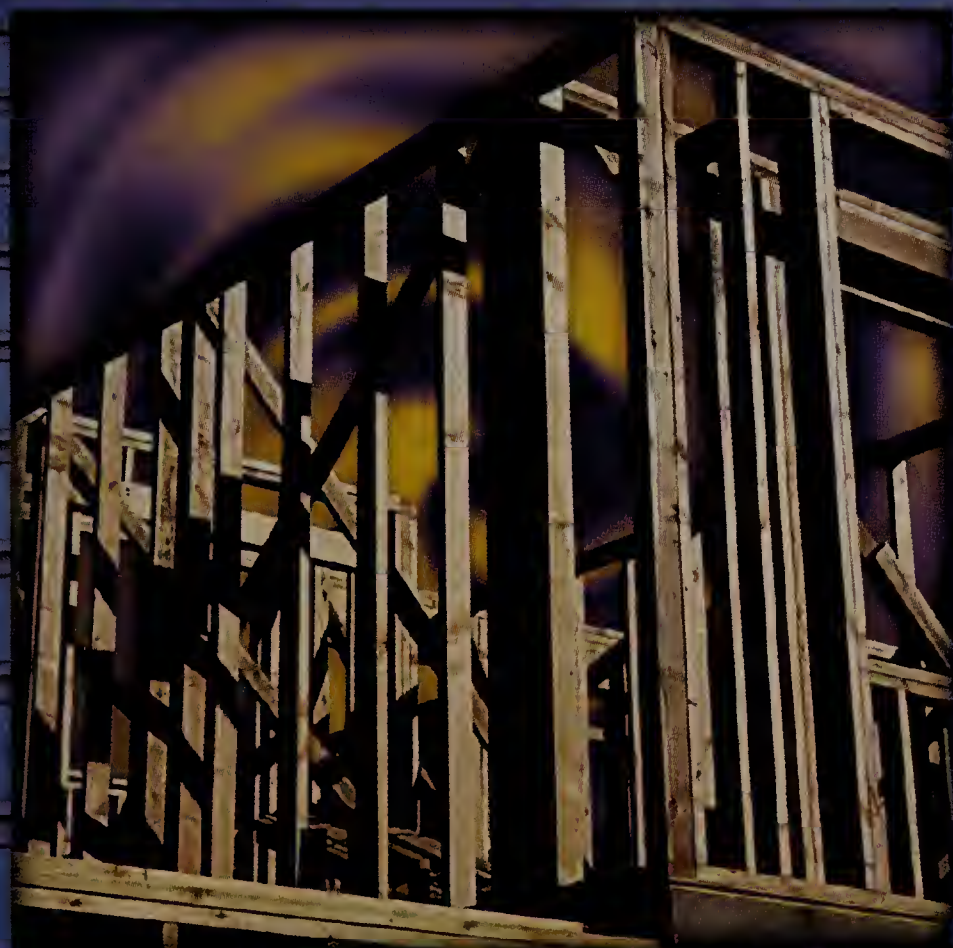
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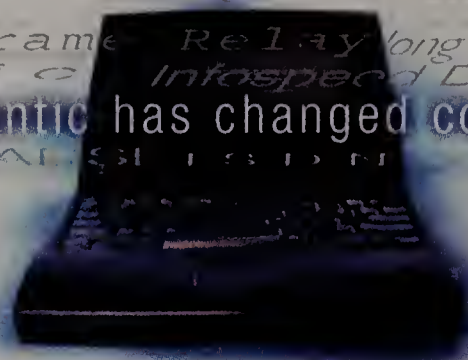
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Career paths: Going

By Renée Gotcher

GONE ARE THE DAYS when every fresh graduate's ideal career track involved rising through the ranks of a Fortune 500 company. Budding start-ups are shaking up the job market across the country — most notably in the high-tech world, where Internet start-ups are sprouting up like weeds in an already tight job market.

As a result, many large, established companies are not seeing the influx of recent graduates they are used to: 27 percent of the Harvard Business School class of 1999 accepted jobs at companies with fewer than 100 employees. And some longtime employees who did move up the ranks the traditional way are heading out into uncharted territory just as quickly.

"This is really the first time that technology and business have blended so well. It has changed the way companies can get started, with a lot less capital and with models and technologies still being figured out," says Rob Miller, president of StartupNetwork.com, a Boston-based job-placement

Start-ups are revolutionizing careers, but they're not for everyone

site for start-up companies and their potential employees. "The Net is a totally new wave of innovation, and people just want to be involved in it."

Start-ups have a lot to offer: the excitement of being part of a huge trend, the chance to possibly help create the next big business success, attractive stock options and other financial rewards, and more.

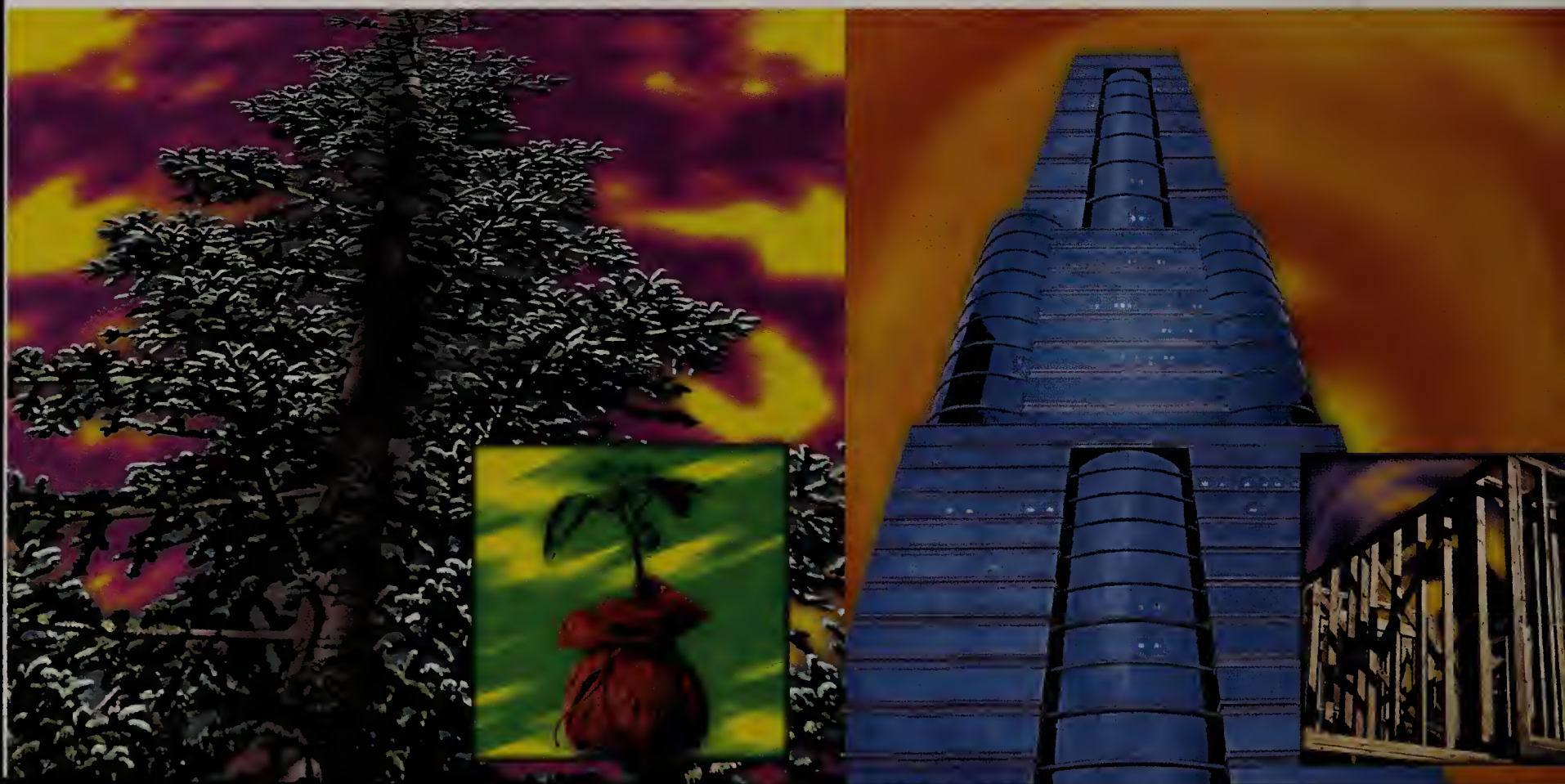
Equally appealing to those who seek varied experiences and opportunities is the culture of a small company.

"I went to high school in the '80s when, from my point of view, the ultimate career

would be to work your way to the top of IBM," says Anne Hale, a business systems analyst at Cardiff Software, in San Diego. "After graduating college and joining a large firm, you are immediately aware of how far away the top is, as well as the levels and politics that need to be navigated in order to move. The amount and variety of involvement in various aspects of the business that you have in a small company far outweigh, in my opinion, some of the trade-offs."

All of these factors are fueling the start-up fire and pulling many technical professionals onboard.

"IT professionals are finding that their skills are in demand everywhere," says Gale Sroelov, vice president and human resources consultant at A&S Computer, in Union City, Calif., who works with many start-ups in the hiring and HR development phase. "They get the advancement in their careers without really trying very hard. And if a professional has an idea, they do not need to concern themselves with a [traditional] career path anymore — they can find funding to start their own venture and do it themselves."



Small to make it big

However, working for start-ups is not for the risk-averse. Those considering making the leap should weigh the potential payoff, in both money and experience, against the high stress and few guarantees that come with start-up work. And they should remember that a start-up may not be the only place to gain entrepreneurial experience.

Riding the wave of change

Several economic and technological factors are driving the current momentum behind start-ups: a healthy overall economy, the explosion of the Internet, and new business opportunities created by these changes.

"Everybody wants to make a killing, and the Internet is fueling it," Sroelov says. "Someone will have an idea, and there is an investor out there who will fund it. The good news is that anyone can and has been able to create and fulfill that American dream."

Technology itself has also moved to the forefront of our economy as high-tech companies drive the stock markets and corporate CEOs place more emphasis on the technology plans of their companies.

"As our economy has shifted to one that prioritizes information services, people with new ideas have become more powerful, and businesses based on new types of information-technology services have a wide-open market," says Elizabeth Falk, a career consultant at Odyssey Consulting, in Arlington, Mass. "The money is out there right now, so the risk to start-up businesses is relatively low. On top of that, a good technology professional can be involved with a 'failed' start-up and still remain respectable because he or she has demonstrated some creativity and initiative."

Because of this phenomenon, start-ups are starting to carry a higher profile as part of the ambitious person's career path. In the past, working somewhere new and small wasn't always taken seriously. Now, many of the negative factors associated with start-up experience, such as short time periods in positions, control over small budgets and staffs, and unproven success tracks, are often overlooked.

"While start-ups would once have been considered risky ventures, it's a much more common part of a career path today," says

Jana Rich, principal at Korn/Ferry International, in San Francisco. "It also means that people are staying in jobs for shorter periods; it's more acceptable to have shorter stints on a résumé while the person tries out a start-up venture that might not always be successful."

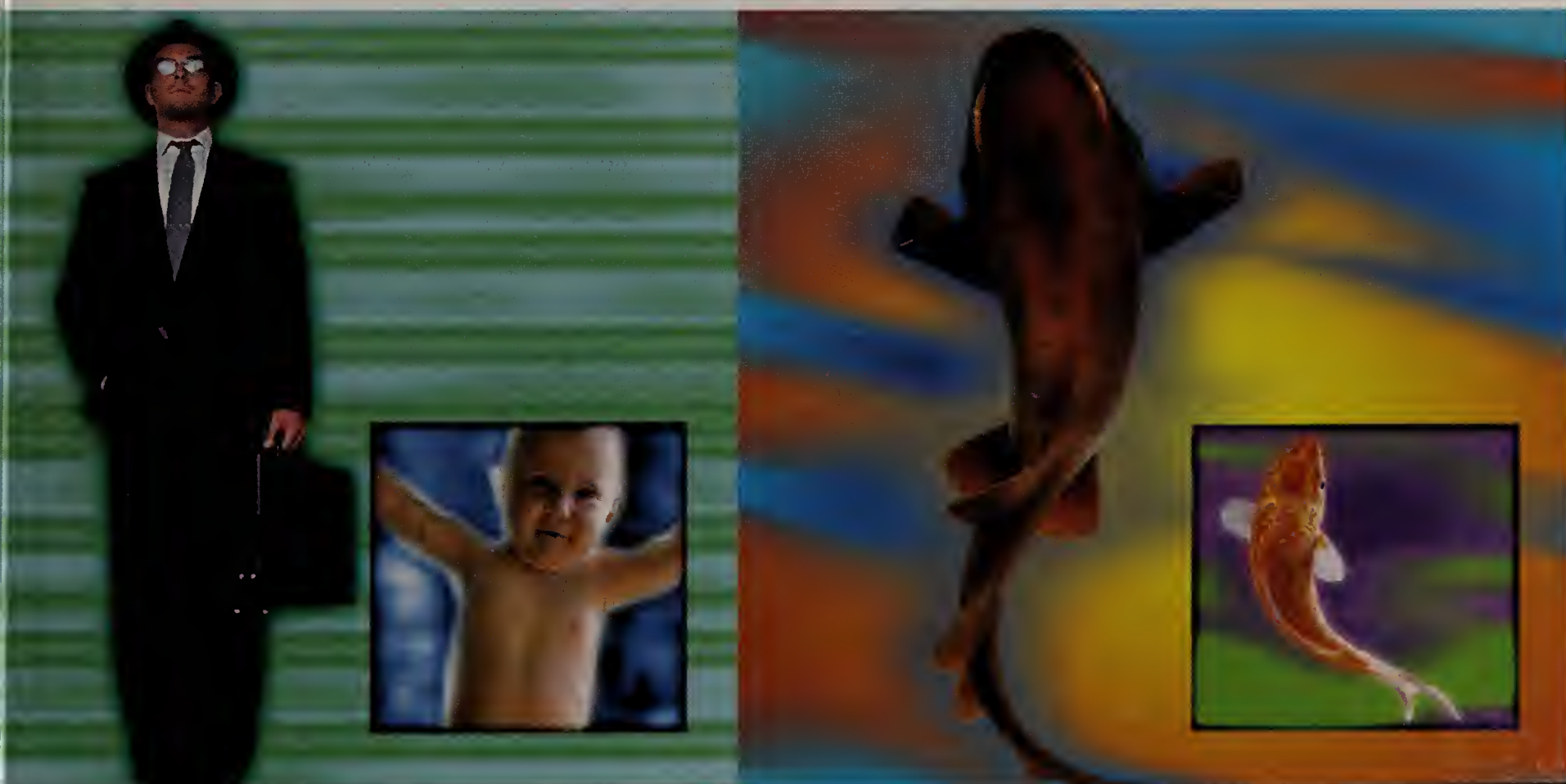
Because of these changes, more and more high-tech professionals are seeking start-up positions. The registered visitors' list on Miller's StartupNetwork.com site is approaching 3,000, with about 300 start-up companies posting current openings.

A Harvard Business School graduate who helped form the school's Cyberposium, an event that brings graduate students together with international business and technology leaders, Miller personally identifies with the lure of start-ups for those who use his site.

"Being involved in all of that excitement is the lure; that's what brought me into it," Miller says. "How do you use the [Internet]? How do you make money with it? It's about not wanting to miss a bandwagon."

Karen Barnes, vice president of engineering at Resonate, in Sunnyvale, Calif.,

PHOTOGRAPHY BY MEL LINDSTROM



The best of both worlds?

On a traditional career path, Monica Nester started out as a small fish in a big pond, spending seven years at Hewlett-Packard, then two at Symantec, and two at Quantum.

But her positions at these corporate giants had one thing in common: entrepreneurial experience. Nester found herself drawn to small start-up organizations within these established companies.

However, the desire to be part of a true start-up caught up with her, and Nester eventually found herself setting out for start-up life, beginning with Intrinsa, a software simulation development tools company in Mountain View, Calif.

"Although I had been [involved] in little start-up opportunities throughout my career, one reason to do a complete start-up is the ability to be there from day one and be a part of the history of a company," Nester says.

Although she made the switch to the start-up track, Nester doesn't think that working for a large company locks a person into a slow or uneventful career path.

"Being in less visible places in a big company provided more opportunity to grow, and I was always in little start-up organizations," Nester says.

Nester is now senior vice president of marketing at another start-up, Annuncio Software, in Los Altos, Calif., which she joined about two years ago. She says she enjoys her hard-working but friendly and diverse co-workers as well as the constant challenges.

"It is so exciting for me; I'm over 40 years old, and I am at the forefront of a new industry," Nester says. "It's really exciting to say that I don't know what our world is going to be like five years from now."

has been attracted to start-ups because of the entrepreneurial draw and the chance to see her work make a difference.

"After going into a smaller environment and a challenging experience, the idea of going back to something huge sounds very boring," Barnes says. "The company is growing by leaps and bounds — it's so fun and there's so much to learn."

Not all greener pastures

But Barnes and others warn starry-eyed start-up seekers to consider carefully what they're looking for before they make the leap. How will they react to a constantly evolving environment? Do they depend on getting a paycheck each week?

"It always amazes me how many people in [Silicon] Valley are more interested in money," Barnes says. "They all think the next start-up will be the thing that helps them retire, rather than 'Will this benefit my career?' But what's the percentage of start-ups that really make it?"

Miller adds that, although the stock options and other projected financial goals sound attractive, there may be other not-so-shiny financial aspects of start-up work. For instance, working for a reduced salary or no salary for a short time is not uncommon at early-stage start-ups. For this reason, StartupNetwork.com asks screening questions designed to give site visitors a start-up reality check.

"For companies in an idea stage, you are going to go without a paycheck," Miller says. "And if that's something you can't do, then you have to consider that when looking at what stage of start-up you will go to, with what amount of funding."

In addition to assessing your ability to manage financial risk, you must also consider the often nebulous nature of start-ups

Start-up stages

IDEA STAGE

Fewer than three employees. Company is gathering market research and creating a product prototype. No revenue.

BUSINESS DEVELOPMENT STAGE

Two to seven employees. Company has completed market research and an alpha version of its product. Less than \$250,000 in revenue.

PRODUCT DEVELOPMENT STAGE

Five to 15 employees. Company has a business plan and either a beta version or a shipping version of its product. Less than \$500,000 in revenue.

GROWTH PHASE

10 to 25 employees. Company is reaching most business-plan milestones and has a shipping product. Less than \$2.5 million in revenue.

PRE-IPO PHASE

25 employees or more. Company is reaching or exceeding its business-plan milestones and has a shipping product. More than \$5 million in revenue.

SOURCE: STARTUPNETWORK.COM

and how that will affect the environment and type of work you do. Many start-ups change direction, product, and purpose several times before being ready for prime time, and that means the nature of your position can evolve several times as well.

"Many people aren't prepared for the commitment they need to make to a new company in order for it to succeed," Odyssey's Falk says. "The more realistic — and mature — professionals are most likely attracted to start-ups because of the opportunities for autonomy and creativity, two things that most of my clients say are high priorities."

Sroelov adds that having a personality and work style that match the start-up pace are key to succeeding on this track.

"The individual has to have a certain personality to make it in a start-up,"

Sroelov says. "If someone

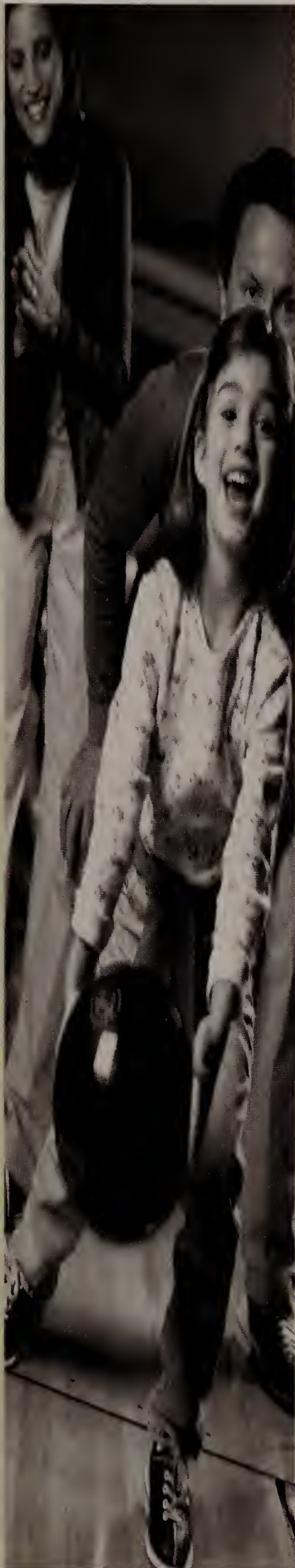
has been in large companies their entire career, they are not going to be able to cut it in a start-up. What I've seen is most small start-ups shy away from the big-firm career people. If someone does step into the fire, they will know pretty quickly if they can cut it. Kidding yourself doesn't work, because there is no place to hide inside a start-up."

Entrepreneurial experience

The good news for those ambitious high-tech professionals who aren't quite ready for the leap into a start-up is that many start-up qualities can be found in large, established companies as well. Particularly as the job market has tightened, more traditional companies have found ways to improve their tangible and intangible benefits to attract and keep good employees, industry observers say.

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focused on the electronic-commerce world or spin out parts of their companies — both to capture economic value [and] as a retention tool to keep their people from leaving to go to the dot-com world,” Korn/Ferry’s Rich says.

And experts say that missing out on the start-up experience won’t hinder your career growth if you are on track at your current company.

“Someone has to be on hand to implement the ideas and the technology developed by start-ups, and there’s plenty of opportunity to learn and grow with an established company,” Falk says.

Monica Nester, senior vice president of marketing at Annuncio Software, in Los Altos, Calif., says that although she is at a start-up now (see box, previous page), entrepreneurial aspects of her previous positions at large companies provided her with the variety and challenge she was seeking.

“There’s a whole different entrepre-

neurial experience taking place out there, so no matter what you’re doing, any involvement that touches the Internet gives you an entrepreneurial experience in a sense,” Nester says.

However, seeking out entrepreneurial experiences in large companies doesn’t always translate into a start-up experience, Falk warns.

“I don’t think there are many truly entrepreneurial opportunities that come from within large companies,” Falk says.

And people who work for successful start-ups — those that grow into big companies — may see fewer entrepreneurial opportunities as the company grows.

“Certainly, it’s possible to stay with a start-up as it grows larger, but that means sticking with a project through some significant changes and challenges,” according to Falk.

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FULL STORY

For past issues and a column by WITI FastTrack’s co-publisher, go to www.infoworld.com/fasttrack.



For this reason, those who are truly built for the start-up lifestyle will often continue to seek out start-up environments after their own company has reached a particular level of growth or success and is no longer changing at a ferocious pace.

“Most people who enjoy the start-up mode usually lose interest after a company has grown,” Sroelov says. “Their roles will change from hands-on to more of a management capacity, and the true hands-on professional will want to have the more isolated ‘work-til-you-drop’ environment from the early start-up.”

However, for those who seek the thrill of the start-up, the current pace of business growth and change seems sustainable. All signs point to room for new start-ups to flourish even as start-ups of the recent past consolidate and become larger companies — or fade into the background.

“I don’t really see any decline in venture investing in the short term,” Rich says. “As business-to-business electronic-commerce continues to grow, we will still experience very strong rates of new companies being funded.”

And the entrepreneurial fuel that has helped spark the start-up wave is not in short supply.

“The lure of the start-up is always going to be there,” Miller says. “People get addicted to entrepreneurship.”

Is a start-up on your career path?

Is the start-up track right for your career? Ask yourself these questions as a starting point.

■ *Do you prefer to create products or work with already defined products?* The more definition you expect when you start working with a product or company, the less likely you would be to enjoy a start-up, or at least one in the early idea stages.

■ *What happens if the company redefines itself? What if the product evolves, or the company’s business model evolves?*

The more averse you are to changing conditions, either in the product or a the way the company operates, the more comfortable you will be working in an established company rather than a start-up.

■ *Do you prefer to define your role within a company or have your position well-determined?*

The more entrepreneurial you are, the more likely you are to enjoy the flexibility inherent in start-up positions.

■ *What are the average number of*

hours per week you find yourself working in a full-time position?

If you gravitate toward 40 to 45 hours per week, you might fit better in a larger company — a 90-hour week might be what a start-up requires.

■ *How many management team positions do you want to see filled before you start? How many people should be at the company?*

The more you expect from the company at the point in which you enter the picture, the more mature or developed the company you target should be.

■ *Would you work for a reduced salary or for a couple of months without a paycheck? What pure financial risk would you consider?*

Assess your complete financial situation. If you are willing to undertake some financial burden for potential payoffs down the road, you are better suited for a fledgling start-up. The more financial stability you need, the older and more developed the company should be.

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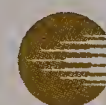
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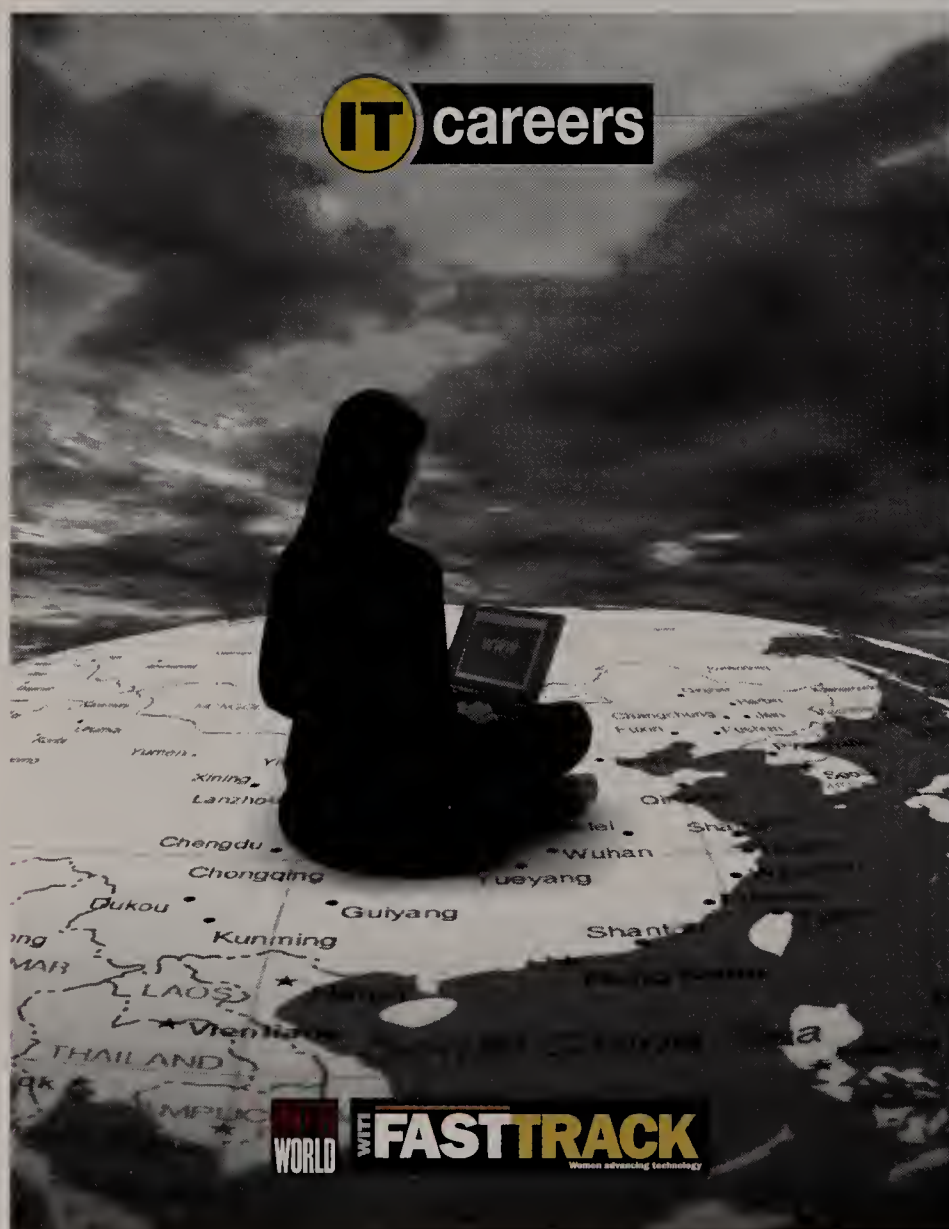
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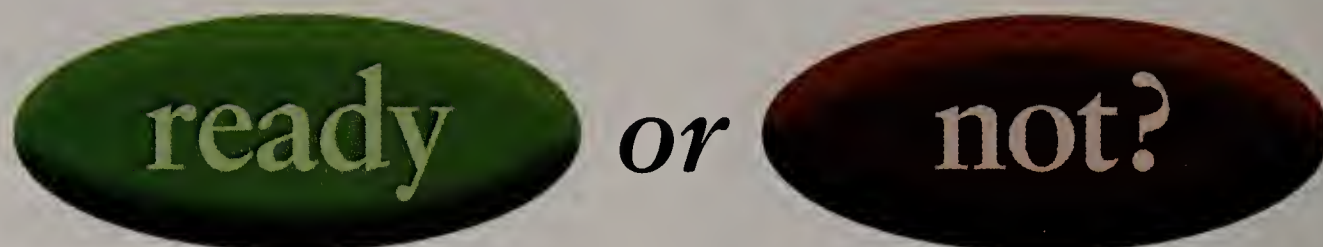
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and selling of product. There is the logistics and the transporting of the product. There is a lot of testing and inspection. There are financial aspects. As a very small company, we can take part in only very selected parts of those processes. To create more value-added services for our customers, we are trying to form partnerships with companies that specialize in those other things.

Mathiasel: Toward this end, one of the real advantages that our industry has is RosettaNet. [RosettaNet (www.rosettanet.org) is a nonprofit consortium of electronics manufacturers and suppliers that is developing a set of standard supply chain processes to let members hook into each other's supply chains. The first set of standard processes was due to roll out this spring.] The e-commerce drive that we're all feeling requires that we have

CARL PASCARELLA: "We're having to reinvent and reposition the way our brand is perceived."

standard ways of exchanging information and standard processes. I think each industry needs its own version of XML standards for this to work. The RosettaNet standards will let us do such things as sharing product designs across the web; sharing manufacturing requirement planning across the web and conducting externally focused ERP that reaches out to the component suppliers and any distributors that may be in the loop.

CIO: Carl, what pressures is Visa feeling regarding connecting with its customers online?

Pascarella: We're facing almost having to reinvent and reposition the way our brand is perceived in electronic commerce. To do that we have to be very bold, if you will, and that's why we set up this new discipline of the E-Visa group. You have to deal with this new channel almost as a different business where you take the core competencies that you had in your physical world and transfer

those skills to the new channel. You have to have superior process design so that you can move to a new channel and motivate, attract and retain the right people.

Extend Yourself

CIO: Michael, define the extended enterprise for us and explain how companies can make sense of it.

Hammer: Instead of looking at customers at arm's length, or suppliers at arm's length, you recognize that you are all really part of what is starting to be called an extended enterprise or virtual enterprise; that it's you, your company, your suppliers, your customers, all working together as though you were one company. The whole internet phenomena is something that's underlying and driving that very intensively.

This is in some sense the final nail in Henry Ford's coffin. *Fortune* recently named Henry Ford Businessman of the 20th Century. Well, he had two big ideas. One, of course, was that he did a lot of work on the assembly line. The other big idea that he had was vertical integration. At his famous River Rouge plant, rubber and iron came in one end of the plant and cars came out the other. He did everything.

Now, we're going in the opposite direction. Companies are doing less and less but doing it better and better. That's being driven very strongly by the internet. One of the great ironies is that Ford, among other auto companies, is turning to a very small number of suppliers and saying, "We don't want to buy parts from you. You're going to deliver a whole subsystem." So one supplier delivers the entire car interior, another delivers the chassis, another supplies the drive train and another builds the body. Ford tells each supplier: "You will deal with the hundreds of vendors that go into making up those components. In fact, we're not going to do detailed technical design. We're going to give you the specs. You work it out." Then when it comes to actual assembly, the plants are organized around the subcomponents, and for final assembly, there are barely any Ford folks there. It's almost all these principal suppliers



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that have to work together to assemble the car under the vague guidance of somebody from Ford, Chrysler or General Motors.

The same deconstruction holds true in other industries. You can say that Visa is really the payments process for a lot of companies that don't want to have to bill individual customers. If you look at somebody like CheMatch.com, it really gives companies the opportunity to not worry about their procurement process. Let CheMatch.com do it. If you look at somebody

BUD MATHAISEL: "It isn't as though we were asleep and didn't understand process before reengineering came along."

like Partners—if they are like a lot of health-care institutions I know, they're having suppliers do more and more of the inventory management for them. Not just managing inventory but getting out inventory and delivering directly to the wards and to the floors.

So that's the phenomenon of an extended enterprise. It's being driven by, on the one hand, the need to deliver world-class value to end customers and it's driven by companies finally having the ability, because of the internet and XML, to work together as though they were one, linking together their disparate systems with a common vocabulary over the net.

Lingren: One of the things that makes the CheMatch.com problem interesting is that unlike possibly Soletron, or a lot of traditional supply chains, we don't have an industry that thinks that if we all just work together and make things more efficient, we'll be one big happy extended enterprise. We have a number of people in the industry who make their living on contention and competition and outguessing other links in the supply chain. We have producers and we have consumers, but we also have traders who take financial positions in a chemical and bet on price movements or volatility. We have brokers. We have distributors. Balancing those different roles and attracting all of those dif-



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DAVID LINGREN: "The only process that matters is the process by which you manage change."

ferent kinds of people to our platform is a much messier problem than just figuring out how to optimize a lot of links in a linear chain.

CIO: So how are you doing it?

Lingren: Well, it's a funny combination of trying to figure out which of those kinds of people we can attract first. Producers for example, feel that price transparency and a high degree of information about transactions works against them because they don't want their competitors to know what they are doing. We almost have to take it one trade at a time and try to figure out what's in it for each of the players and try to figure out whether to go after buyers first and then attract sellers or vice versa. It's a very tactical and ad-hoc activity.

And this brings up a question. To me, process denotes repetition and at least some measure of stability. But our business changes constantly and we don't have many repeatable processes—most are tailored to individual customers. How important is it to carefully define a process that you're only going to execute once? And at what point does process turn into a kind of portfolio of individual products or projects? Where do we need project management as opposed to process definition? What's the balance?

Hammer: That's a question that a lot of people are asking now. I don't think process means bureaucracy, but it does mean definition. If you're only going to do things once, then why bother to define the process so carefully? What I think we're going to see is a framework, a fairly loose process for doing a whole set of different projects under that framework. What do the rest of you per-

ceive? Are your organizations stepping up to all of this stuff?

Thompson: The promise that we make to 250 million consumers here in the United States is that they're going to be able to use their Visa card whenever and wherever they want. By default, the promise that we're making is a processing promise. Our systems are going to be there to successfully process 2,500 transactions a second around the world.

We have metrics to measure the performance of our systems and the processing we do. The conflict comes about, however, when you are forced by the nature of competition to introduce new functions into this enormous processing engine. There isn't enough time to model these new functions to predict and ensure that the new functions won't negatively influence the processing of these other transactions. So you have this natural, built-in conflict to changing processes. We have it all the way down to the consumers because what we know from our studies and research is that they want that piece of plastic to be able to do more than it does today—paying for goods and services is not enough. In order to keep pace with their needs, wants and desires, we need to do things that might have been unacceptable years ago because we didn't want to negatively influence processing. We need to take more risks on a daily basis to allow our organization to move that much faster than it would otherwise.

CIO: So do you see a great tension between what's being demanded of you on the outside and what you can accomplish internally?

Thompson: It's more a question of do you have the will to do it at the pace that the marketplace demands. So let me give you another example. Some of our merchants came to us and said, "Look, we find it ridiculous that we would have to invest in your infrastructure as well as all the other competing brand's infrastructure. Please allow us to send MasterCard transactions over your network."

You can imagine the tension in the organization, particularly an organization that's grown up with the brand promise that we have, when a value proposition as I've just

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described is presented to us. In some sense, it's unnatural. It's an unnatural business decision to say to yourself, "OK. I'm going to allow my railroad in this case to be used by my main competitor."

We eventually concluded that we absolutely need to do this because if we don't, somebody else will, and we will have lost out on a very important part of our brand promise in the relationship we have with merchants. It was really a question of will and willpower. You know, are we big enough as an organization that we can allow somebody else to leverage our largest asset and yet continue to compete successfully as we have in the past.

Playing E-Commerce Catch-up

CIO: Michael, what do you say to companies that are behind the curve on electronic commerce? Is ERP the best platform for large companies to begin developing electronic commerce processes?

Hammer: We are stuck with something like the equivalent of ERP as an entry point. It isn't the whole answer, but there are two reasons that I would give for an ERP solution. An enterprise cross-cut of information flow is important not only because it provides you with a consistent set of processes for interfacing to the outside world, but it's only through ERP that your operational people get the kind of insight that they need to do their knob tuning for their piece of the business. I mean, you have to remember that the enterprise is still comprised of individuals. Those individuals need to know how they are contributing to the whole because they're not doing the whole. ERP is the best way that I've seen for people in materials organizations, or people in finance, or people in the manufacturing organizations or people in transportation to know where they stand.

Thompson: This ERP approach is clearly not a direction that we intend to go in. In fact, where we are investing money for the future is at the very front end of our business—the network. Not to integrate the internet into it, but to make our network that much more



flexible than it has been historically. So the premise we're using for our architecture is get the transaction onto the network. The network will be intelligent enough to know what that transaction is and what to do with it. We can add functionality to the network much more quickly than if we tried to modify our core systems.

Lingren: This relates to a belief I have that the only process that matters is the process by which you manage change. The processes that endure are the processes that measure and respond to things happening in your customers or in the outside world and that prompt changes in the way you interact with those things. [Consultant] Dick Nolan has been saying for years, "We're moving from a situation of make and sell to a situation of sense and respond." That sensing and responding and that adaptation, that's permanent.

Hammer: I think that is an area of process that only a few companies have begun to

SCOTT THOMPSON: "Are we big enough that we can allow somebody else to leverage our largest asset?"

think about, which is really the management of the process. This is about learning to think in a disciplined way and to measure how we do the strategic management work of an enterprise, of identifying new opportunities, setting priorities and doing resource allocation. In a lot of companies, that is still done ad hoc as a result of luck and talent and wisdom, and therefore, is high risk and non-replicable. The idea of really turning that into a replicable process may be the most important thing we can do because the internet is clearly the issue of the moment; but I'm willing to bet that in five years there will be some other issue of the moment. Instead of lurching from issue to issue, we need to have a structured process so that we can respond quickly and reliably to new environmental situations. **CIO**

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A new book argues that reengineering fails when people forget the practice that provides meaning to the process

PRACTICE makes PROCESS



BY JOHN SEELY BROWN
AND PAUL DUGUID

In *The Social Life of Information*, published later this month (March 2000), authors John Seely Brown and Paul Duguid argue that the gap between digerati hype and end user gloom in our companies is largely due to the tunnel vision that's bred by information-driven technologies. We need to look beyond our obsession with information and individuals to include the rich

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social networks that add meaning to all forms of work. Drawing on experience from Xerox PARC (where Seely Brown is director) and other organizations, the authors reveal that without an understanding and accounting of the important role sociability plays, success of such movements as the automated home office, knowledge management and the digital university will be limited at best. In this excerpt, the authors explain why disregard for the sociable “practice” of work has undermined the success of process-dominated reengineering efforts in many companies. (For more perspective on reengineering in today’s e-business environment, including Michael Hammer’s take, see “*The Process Starts Here*,” Page 144.)

One of the many virtues of “business process reengineering” was that it was clear, direct and consistent. Michael Hammer and James Champy developed reengineering in response to “the crisis that will not go away.” It presented a clear antidote to organizational inconsistency, inertia and gradualism. Reengineering manifestos assumed that business organizations were similar to other bureaucracies. Over time, they come to serve themselves first, customers and investors next. As a consequence, established businesses are rife with divisions and diversions that drain resources but, from the customer’s point of view, add no value. Taking “a clean sheet of paper,” reengineering teams were told to reorganize their organizations around the processes that did add value, making these the center of the new organization.

With this sharp distinction between value-adding and non-value-adding processes, reengineering insisted on sweeping away old practices. “Forget all you know,” managers were told. “Don’t automate, obliterate.” Like all organizational fads, it also puffed itself up with some grandiose claims. Hammer and Champy, for instance, insisted they were transcending Adam Smith, one of the most enlightened thinkers of the 18th century and a pervasive influence on modern economics.

Slogans aside, there was enough substance

for reengineering to acquire an impressive following. AT&T, Ford, Hewlett-Packard, IBM, Nynex, Seagram, Xerox and a host of other corporations great and small reengineered. Soon, 50 percent of Fortune 500 companies had vice presidents of reengineering. Results, too, were impressive. Reengineering seems to have been behind the transformation of several dinosaurs of the industrial age into phoenixes for the digital age.

Nonetheless, by the mid-1990s, reengineering’s stock was plummeting. Some critics claimed that this “pernicious panacea” never came close to the results promised (such as a 75 percent drop in overheads). Moreover, while the changes in output were often trumpeted, they were not always set against the costs of input. Other critics claimed that reengineering was obsessed with technology, to which reengineered firms became subservient. And for many people, reengineering was little more than a euphemism for downsizing.

Successes and Failures

As reengineering stumbled, reengineering consultants themselves began to be downsized. They received little sympathy from those who had seen reengineering as a consultant’s mint. (A senior partner in Andersen Consulting apparently intoned, “God bless Mike Hammer,” as company revenues reached \$700 million.) They probably needed



The Social Life of Information

By John Seely Brown and Paul Duguid
Harvard Business School Press, Boston
March 2000, \$25.95

little sympathy, for many moved swiftly across the hall to the suites reserved for the next fashion, knowledge management.

This succession strikes us as particularly interesting. Was it merely a case of a new fad fortuitously and fortunately succeeding an exhausted old one? Or was there, perhaps, more than chance to the sequence? Did the focus on process, perhaps, overlook the increasing demand for knowledge in modern organizations? We suspect it did. Consequently, looking at reengineering in the light of knowledge, as we do here, may help reveal both the strengths (often hidden behind catcalls) and the weaknesses (equally hidden behind cheerleading) of reengineering.

Perfecting Process

It is perhaps significant that many of the celebrated cases of business process reengineering come from a fairly narrow band of operations. Procurement, shipping and receiving, warehousing, fulfillment and billing are favorites. These generally account for the most impressive results, with inventories transformed into just-in-time delivery, fulfillment and billing accomplished in days rather than weeks.

In these areas of work, processes are relatively well defined. They usually have clearly measurable inputs and outputs. And, as we might expect from a process-oriented

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view, they emphasize a linear view of how organizations work. To complete a process, something passes from A on to B ending with C—from, for example, receiving to manufacturing to shipping. In such well-defined processes, it is the “longitudinal” links between each stage that appear to matter. Lateral ties among people doing similar tasks—among, for example, the people in shipping—appear at a heavy discount from a process-based perspective. They are generally regarded as non-value-adding.

Consequently, with regard to information, reengineering directs attention to the infor-

just-in-time processes both require and generate “a rich flow of precise and targeted information about what was happening throughout the production process.”

Such a focus is undoubtedly invaluable for organizations. Nonetheless, focusing on longitudinal process and the information that goes with it may lead to tunnel vision. Although reengineered organizational charts may happily represent organizations in terms of these types of process, neither linear processes nor charts encompass all that goes on in organizations.

It is not surprising, then, that business

has research and development. In such areas, life is less linear; inputs and outputs are less well defined; and information is less “targeted.” These are, rather, areas where making sense, interpreting and understanding are both problematic and highly valued—areas where, above all, meaning and knowledge are at a premium.

Meaning and Ends

Process perspectives are not necessarily indifferent to meaning. James March, one of the preeminent figures in organization studies, sees a close link between the two. “It is,” he

argues, “process that gives meaning to life, and meaning is the core of life.” For March, however, “Outcomes are generally less significant...than process.”

Focusing on longitudinal process and the information that goes with it may lead to tunnel vision.

mation that flows across longitudinal links. This information helps to coordinate the complementary activities that make up a company’s critical process. So, for example, the sociologist Charles Sabel stresses how

process reengineering has had less success in the parts of organizations that are less linear and less clearly defined by process and information. Management, for example, has proved notoriously hard to reengineer. So

Curiously, reengineering tends to see things the other way around. It focuses most heavily on the input and output of the stages in a process. It is relatively indifferent to the internal workings of these stages—to the particular practices that make up a process and the meaning they have for those involved.

Given this indifference, it is not surprising that studies of workplace practice, of the internal life of process, often reveal tensions between the demands of process and the needs of practice. Nor is it surprising that these tensions are often the result of struggles over meaning. These struggles, furthermore, are not confined to the “thinking” parts of organizations. They occur throughout, pitting the process-focused need for uniform organizational information against the practice-based struggle for locally coherent meaning.

Etienne Wenger, formerly of the Institute for Research on Learning, revealed this tension, for example, in his study of the



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comparatively “lowly” and well-defined process of claims processing. He found that many of the problems faced by the health-insurance claims processors he studied could be traced to clashes over meaning and sense making—over such things as what a form signifies, why similar claims elicit different reimbursements, and who does or does not qualify for reimbursement. In the end, these problems for the claims processors create problems for the company.

To do their job, processors need to be able to make sense of what they do. The company offers explanations. But, from the processors’ point of view, the organization’s information and explanations are difficult to use. They explain things in terms of the company’s overall goals and processes, but they take little account of the immediate practicalities of the claims processors’ work. Indeed, many of the company’s explanations have the ring of those parental imperatives that skip explanation and simply say, “Do

ers of their own craft just as doctors and lawyers are practitioners of theirs.

Looking the Other Way

These two aspects of organizations, one process-based and the other practice-based, not only look from different directions—from outside a process and from within—they also look in different directions for the resources for understanding. From outside, people find meaning in functional explanations. They rely on process-based, cross-functional, longitudinal accounts of why things are done. From inside, people take a lateral view. The claims processors, for example, look less to their superiors or to the people to whom their work goes next than to their peer group for explanations of what they do and why. For them, knowledge comes more from fellow practitioners than from cross-functional connections.

These contrasting sources of meaning and understanding present business process

bloodless account of businesses. Reengineering begins with processes into which people are then inserted as needed. “Process owners,” as Hammer puts it, “are focused on process, not on personnel.” Personnel, for their part, seem to face the option of getting on board or getting out. Opportunities for them to craft, change, own or take charge of process in any meaningful way are limited. While lip service is paid to them, improvisation and “local” knowledge have little place in these schema, particularly if they challenge the coordination of process.

And fourth, business process reengineers tend to discourage exactly the sort of lateral links that people pursue to help make meaning. Focused on longitudinal cross-functionality, they dislike, and often try to discourage or even disempower, occupational groups, job categories and local workplace cultures. Encouraging cross-functional links between occupations, business process reengineering tends to see the contrasting links within occupational groups as non-value-adding. Here, then, we see in another form the problems that beset the worker at home alone. Focusing on individuals, process accounts overlook social resources that people in similar occupations provide one another. Tunnel-visioned process accounts rarely understand the importance of these resources. (In an exemplary piece of partial blindness, for example, British Telecom did notice the damaging isolation of its home workers. As a remedy, however, it decided to pipe the sound of canned background chatter into their home offices.)

These four biases, as we said, make it difficult for business process reengineering to deal with practice. Yet the tensions between process and practice, between the structure provided by one and the spontaneity provided by the other, are key structuring forces in an organization. Consequently, you can’t redesign process effectively if you don’t understand practice. **CIO**

To do their job, processors need to be able to make sense of what they do.

it this way because I say so.” Such imperatives make life easier for the company but difficult for the processors, who need to understand what they do to do it well and also must justify their actions to customers.

Wenger’s work reminds us that, while process is clearly important to the overall coherence of an organization, in the end it is the practice of the people who work in the organization that brings process to life, and, indeed, life to process. Organizations, then, should not attend to the process and process-related explanations only. They must also attend to practice. By practice, of course, we do not mean the sort of rote exercises people associate with phrases like piano practice. Rather we mean the activity involved in getting work done—the sort of activity that lies at the heart of medical practice or legal practice, for claims processors are practition-

reengineering and process views of organization with difficulties for several reasons. First, business process reengineering tends to be somewhat monotheistic. There is not much room for variation in meaning in its camp. The process view is expected to explain all.

Second, despite talk of rebuilding from the bottom up and empowerment, business process reengineering tends to be relentlessly top down. Indeed, some suggest that it is of necessity a top-down, command-and-control procedure. (It is not surprising that one of the most enthusiastic and successful reengineers has been the Army.) Together, these two biases of business process reengineering make it hard to see and harder to understand the needs of people whose practices make up processes.

Third, the top-down view tends to give a

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HAMMER RESPONDS:

PROCESS MAKES PRACTICE better



Over the past decade, I have read innumerable simplistic, misinformed and simply wrong critiques of reengineering. It is therefore a pleasure to encounter John Seely Brown's and Paul Duguid's intelligent analysis of reengineering and its limitations. They may be surprised to learn that I largely agree with their central points. Nonetheless, I do take issue with some of their assertions, and we also diverge on some issues of priority and emphasis.

Seely Brown's and Duguid's piece revolves around the difference and the conflict between process as defined by the company and practice (that is, the ways that individuals apply those process rules to their specific jobs). They submit that successfully redesigning work requires serious attention to practice and that reengineering overly emphasizes process to the detriment of practice. With their first point I have no argument; but on the second I must demur. While reengineering's central focus is indeed on the redesign of processes, it does not regard practice as irrelevant. A high-performing process requires both a high-performance design and high-performance execution of the design; without the latter, the potential of the former will never be realized.

Far from seeing the lateral links between people as non-value-adding, reengineering sees them as essential. A uni-dimensional organization, focused solely

on processes, cannot succeed any more than can a purely functional organization. People need to affiliate with others of their profession, for purposes of both personal development and practice sharing; the mechanism for this is what I have called the "center of excellence." (This has much in common with Seely Brown's "community of practice.") Everyone in a reengineered organization should be a member of a center of excellence, led by a coach, as a complement to their role in a process that is led by a process owner.

The authors' assertion that reengineering has largely focused on highly structured processes, such as procurement and fulfillment, and less on more knowledge-intensive processes, such as management and research and development, is partly true and mostly misleading. In the early days of reengineering, companies did indeed concentrate on back-office processes, but not because of some bias against knowledge and practice. They did so because these were the processes that were in most dire condition, and where improvements would most quickly be seen and impact the bottom line.

However, over the last few years, reengineering has broken out of the back-office box and is now being widely applied to more knowledge-intensive, front-office processes, such as demand creation (marketing), order acquisition (sales) and product development. Applying reengineering and the discipline of process in these domains has not meant deprofessionalizing salespeople, marketers and scientists,

stripping them of their affiliations and turning them into automata following the iron rules of process. It has meant putting their work in the context of the big picture and ensuring that all necessary tasks are done in the right order. The more attention that is paid to such processes, the more importance that practice assumes. While I do recognize the criticality of practice, I plead guilty to putting process first. Without a well-defined and well-designed process, people's talents are wasted and leveraged. Process provides the structure into which practice fits; without process, practice can spiral into random improvisation and inconsistency.

I also have a different take on one of the most interesting points in the piece, the discussion of finding meaning in work. We are agreed that meaning is what transforms work from drudgery into a transcendent experience; however, we disagree on the primary source of this meaning. Seely Brown and Duguid maintain that it comes from community, from the social connections that people make with others.

While not minimizing the importance of community, I suggest that it is secondary to customer. What truly imbues work with meaning is the sense that one's work has a larger purpose, that one's individual activity fits together with the work of others to create a result for a customer, an individual or enterprise that values the result. There is as much community in process as there is in practice. For the individual and the enterprise, fulfillment requires a blend of these two axes. —Michael Hammer



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Emerging technology

INNOVATION and PRODUCTS in the VANGUARD

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3-D Finally Gets Serious

As e-tailers go for higher doses of reality, they're turning to previously overlooked 3-D technology BY JOHN EDWARDS

IF YOU'RE GOING to promise customers that they can test-drive a car or try on clothes over the world wide web, it better be a true-to-life experience. That's why G.Wagen.USA, Lands' End and a growing number of businesses are experimenting with the rapidly emerging field

of three-dimensional web technology.

For its part, G.Wagen.USA is developing a multidimensional website for the Gelaendewagen by Mercedes-Benz, or G-Wagen. The site's thousands of digitized images will enable visitors to view the sport utility vehicle from almost

*Edited by Sari Kalin.
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Can IT Managers Be Heroes?

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BUZZ WORDS

ATEOTD
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of the day

any perspective, says David T. Holland, president and CEO of G.Wagen.USA in Santa Fe, N.M. "Ultimately, we will have

a virtual showroom that will allow people to view different colors and options, walk around, see what the vehicle's inside looks like—even test-drive an off-road course," he says. "It's a very good way of showing how the vehicle performs."

Yet while Holland and others are counting on 3-D to add new levels of excitement and realism to e-commerce websites, the technology is burdened with a disappointing history. From red-and-blue glasses to virtual reality modeling language, or

the web's next frontiers," says Vijay Kanabar, director of the e-commerce master's degree program at Boston University.

"With bandwidth costs plummeting and technologies improving, retailers are finding themselves free to experiment with new, innovative technologies."

This current crop of 3-D tools marks a major advancement over previous-generation products. "VRML-based software, for example, was cumbersome and slow," Holland says. The latest 3-D software, while functional at speeds as slow as 28.8Kbps, doesn't sacrifice quality for efficiency. "On our simulation, the wind-

"With 3-D on the web, realism is very important to believability."

—David Holland, president and CEO, G.Wagen.USA

VRML, nothing has helped to extend the reach of 3-D from the world of action games and niche applications to the business mainstream. Until now. Although development and implementation pitfalls remain, 3-D technology is helping e-tailers give online shoppers ways of viewing, testing and selecting products in ways that nearly mimic a real-world experience. Innovative tools—including server software, application development systems and browser plug-ins—combined with swifter internet access speeds, are finally transforming 3-D from an attention-starved teenager into a solid corporate citizen.

In the past two years, 3-D web development products have flooded the market. Market leaders include MetaCreations' MetaStream 3-D streaming format; Flatland Online's 3DML, a markup language similar to HTML; Play Inc.'s Amorphium graphics engine; Oz.Com's Fluid3D plug-in for RealNetworks' RealPlayer G2; and Cycore's Cult3D modeling application. There is also an array of specialty tools from a wide range of vendors. "Vendors are viewing 3-D as one of

shields and the chrome reflect a desert landscape. As you drive, the reflections shift in perspective," says Holland. "Realism is very important to believability."

Features Extract Steep Price

G.Wagen.USA is basing its 3-D presentations on Cult3D from Cycore in Uppsala, Sweden. The Cult3D rendering engine allows users to move through a 3-D image using their mouse as a controller. Animations can be embedded into any HTML page and viewed with standard browsers using a free plug-in that end users must download. Connections can be as slow as 28.8Kbps without losing interactivity or image quality.

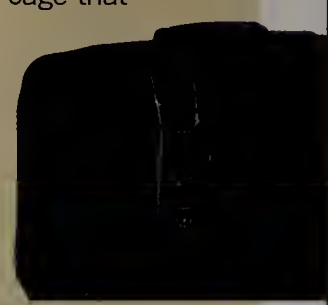
But eye-catching 3-D features can come at a steep price. Creating a 3-D website is a tedious, costly and time-consuming process. The G-Wagen project requires five full-time digital artists, who are painstakingly creating a stream of images and data. Site development has taken at least three-quarters of a year. "The good news is that once you've assembled all the specifica-

new products

Just Try Cutting Through This

What do bicycles and notebook computers have in common? Unscrupulous thugs like to rip them off. **Kryptonite Corp.**, a maker of the popular namesake bicycle lock, wants to make it tougher on notebook thieves.

The flagship product is **KryptoVault**, a steel cage that prevents robbers from opening the computer. KryptoVault also includes a heavy-duty, 8-millimeter braided steel cable for locking notebooks to physical structures. It comes with a \$500 anti-theft guarantee. Suggested street price: \$79.95. For more information, visit www.kryptonitelock.com or call 781 828-6655.



Where Has Your Touchscreen Been?

Getting money from an ATM can be downright icky. Seriously. Just imagine all those people who put their grubby fingers on the touchscreen, spreading germs that now lie invisible and waiting for you.

For such hypersensitive hygiene folks, good news is on the horizon. **MicroTouch Systems** recently introduced **CleanScreen**, the world's first antibacterial touchscreen.

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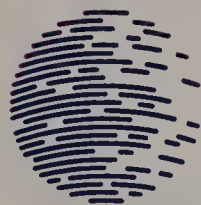
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tions, you can use the data in thousands of different ways. At that point, the time from development to deployment moves quite rapidly," says David Schweitzer, G.Wagen.USA's acting CIO.

The 3-D Catalog

The complexity of 3-D development is driving some businesses, such as The Sharper Image, to outsource development and implementation work. The specialty-item retailer is using 3-D to create an online version of its storefront shopping experience. "It's hard to find people who are skilled in this quickly moving technology, so we decided it would be more cost-effective to use an external provider," says Meredith Medland, former director of the San Francisco-based internet division of The Sharper Image.

For the 3-D work, the company tapped Viewpoint Digital, a subsidiary of Islandia, N.Y.-based Computer Associates.

Innovative tools combined with swifter internet access speeds are finally transforming 3-D from an attention-starved teenager into a solid corporate citizen.

Viewpoint generated 3-D images of more than 20 products. Using a free Shockwave plug-in and their mouse, shoppers can manipulate the products in an infinite variety of viewing positions. "Sound support allows users to hear sounds generated by each product, such as a CD being ejected from a player," says Sandeep Divekar, Computer Associates' senior vice president of visualization strategy.

Medland believes that 3-D technology

BUZZ WORDS

CO-LO

Short for co-location, as in outsourcing of websites

has exerted a positive effect on The Sharper Image's website and bottom line. Since the technology was introduced to the site in March 1999, page views are up 300 percent, and there has been a 50 percent increase in time spent in areas of the site that feature 3-D

images (although some of that added time may be the result of users with 28.8 and 56Kbps modems waiting to download images). Medland notes that The Sharper Image racked up \$4.9 million in internet sales during 1998; she expects 1999 sales to reach over \$25 million.

Clothe Me in 3-D

Lands' End, the Dodgeville, Wis., catalog and storefront clothing retailer, is using web 3-D technology to help shoppers evaluate garments on lifelike models before making a purchase. It is using My Virtual Model software from Public Technologies Multimedia in Montreal to allow customers to create a customized 3-D model that reflects their unique physical proportions as well as face shape, hair style and skin tone.

My Virtual Model is an application server that provides 3-D graphics to any standard web browser without the need for additional plug-ins. An object-oriented design and an open applications programming interface (API) allows the software to run alongside major e-commerce and legacy retail systems.

The site enables shoppers to find garments that fit properly and enhance their particular body type. "We wanted to solve the age-old problem of, 'What size am I at your company?'" says Elizabeth Ragone, Lands' End's e-Merchant. The female model can be rotated 360 degrees, allowing shoppers to view a garment from various angles.

Ragone says implementing the software took a dedicated effort by a team of staff

new products

Bonded directly on the touch-screens of ATM machines, restaurant systems and information kiosks, CleanScreen uses a proprietary treatment that prevents bacteria and other microbial contaminants from accumulating and growing. Sounds too squeaky clean to be true. For more information, visit www.microtouch.com or call 978 659-9000.

Keys to Your Handheld Computer

Inputting a lengthy memo, one letter at a time, into a handheld computer can be a frustrating experience. Relief though is nigh.

Startup **Think Outside** has created Stowaway, a portable keyboard for some handheld computers. **Stowaway** is a full-sized keyboard when opened; when closed, it measures 3.6 inches by 5.1 inches by .08 inches. The keyboard weighs only 7.9 ounces and costs \$99.95.

Finally, a compact keyboard you can take on the road. Of course, even a keyboard this small doesn't really make your handheld computer a "handheld" anymore. For more information, visit www.thinkoutside.com or call 858 793-2900.



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and outside resources over the course of several months. Over the past year, it has become one of the site's most popular features, with more than 450,000 users creating models since its implementation in November 1998 through June 1999. The technology also helps Lands' End get a better understanding of its web shoppers, since styles, colors, sizes and other preferences selected by users are automatically stored in a demographics database. "It has turned out to be a big plus for the company and the site," she says.

Growing Pains, Future Gains

Pluses aside, potential adopters need to be aware of some pitfalls. "The biggest mistake organizations make when implementing web 3-D is not doing their homework," says G.Wagen.USA's Holland. With so many options available, the best way to zero-in on a technology, he says, is to thoroughly test all likely candidates. "It's hard to rely solely on recommendations or impartial analyses, since a 3-D tool that's suitable for one type of website may not be right for your needs."

3-D overkill is another trap, says Amber Eaves, an editor at news giant CNN Interactive in Atlanta, who specializes in technology. CNN is using 3-D on its site to bring context and depth to complex news stories. "You really have to find a reason to use 3-D. Too many companies give no thought to placement and context and simply spread 3-D throughout a site," she says.

Yet despite current growing pains, 3-D's evolution into a major web force seems to be unstoppable. "In the future, we will see more and more retailers using 3-D technology as a way to attract customers," says Boston University's Kanabar. "I think we're looking at an important new way of using the web to generate sales." **CIO**

John Edwards, a freelance technology writer based in Gilbert, Ariz., can be reached at jedwards@john-edwards.com.



REVISIT 4GLs

Old Languages, New Twist

4GLs grow from report generators to systems integrators

BY FRED HAPGOOD

IN JANUARY 1990, *CIO* ran a double article weighing the value of the so-called "fourth generation languages" or 4GLs. These were and are special-purpose application builders customized to specific application domains, such as generating business reports. They are contrasted to general purpose languages (GPLs) or "3GLs," like Cobol or Fortran or C, with which a skilled programmer can build almost anything.

These articles were not, as is sometimes the case, introducing a radical innovation that was shaking up the IT landscape. 4GLs had been on the market, competing with the various 3GLs, since the 1970s. Their selling point was simplicity. 4GL functions were expressed in ordinary English and linked together with everyday syntax. (One offhand definition of 4GLs is "a language that can be learned in two days.") They achieved this simplicity by

reducing the most common operations to single commands. A typical 4GL instruction might read: "Extract all customers where 'previous purchases' total more than \$5,000." The same statement written in Cobol would run to the end of this article and beyond.

Since each statement taken alone was more powerful than an average statement in a GPL, 4GL programs were shorter and therefore easier to understand and maintain. Thus even those skilled in GPLs might choose to work with a 4GL because at least in theory they could do the same work with fewer statements. According to Gerald Cohen, CEO and founder of Information Builders in New York City, which introduced and still sells one of the very first 4GLs (Focus), "3GLs told the system how to do the application; 4GLs told it what to do."

Nonetheless, the *CIO* pieces did not add up to an enthusiastic endorsement of the



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technology. Since each command was like a little program that had to be separately executed, 4GLs were slow. They cost money, whereas most 3GLs came free with the hardware. Most important, 4GLs worked well only for their own problem domain. If any aspect of your project called for a function unanticipated by 4GL's designers, you were back paging through the manual of Cobol commands. An IT worker might as easily decide to stick with his 3GL as take a flyer with one of the new languages—and many did. "4GLs were like houseboats," Jay Valentine, once a 4GL sales rep (and now CEO of InfoGlide in Austin, Texas), remembers today. "Not very good houses; not very good boats." The article reflected that ambivalence.

In the early '90s, 4GLs found a new opportunity and identity. By their nature the

especially since the pace of change ensured that the job would just have to be done again in two weeks. The central task of IT personnel became finding ways of gathering up all these cats and lashing them into a common harness.

4GLs turned out to be ideal for the purpose. As before, their job was to isolate users from complexity, only now the complexity in question came not from programming languages (alone) but from a proliferation of operating systems, database types and application deployment models. The essence of the technology changed from application development to legacy management. In this model, 4GLs kept a reasonably stable interface, thus minimizing retraining costs, while vendors (such as Computer Associates and Cincom Systems) kept expanding the list

"4GLs were like houseboats. Not very good houses; not very good boats."

—Jay Valentine, CEO, InfoGlide

programs focus on the most burdensome task faced by IT personnel at a given moment. In the 1970s and '80s, that task had been writing programs that supported business reporting, that is, routines that pulled data out of a large, complex database running on a mainframe, processed it, configured it to the requirements of a given form and mapped it onto a screen presentation.

By the late '80s and early '90s, business computing began moving in several directions at once. Networks were migrating from terminal/host to client/server (and growing much larger and more heterogeneous); databases, from indexed to relational systems; operating systems, from proprietary languages to Unix variants; and end user interfaces to the Windows model. All the applications and files that had grown up in the mainframe/mini world needed to be ported into this dynamic, nearly chaotic, environment. There was no time to rebuild all these legacy resources,

of environments that 4GLs understood through frequent upgrades.

In the mid-90s, several trends arose that seemed favorable to the technology. Faster processors cut the performance penalties. Prices went down. The internet, with its webcentric browsers and distributed database querying, threw up another wave of complexity that 4GLs could shield grateful users from. 4GLs, with their mainframe origins, seemed perfectly positioned to address the internet-based popularity of server-side applications.

Indeed, the need turned out to be too great to be confined by a single software category. Every computing context started to demand specialized application development tools, from web pages to server systems through the whole middleware revolution. Perl arose, as did HTML—both occupying niches that once might have been the property of 4GL tools. Graphical development tools emerged that undercut

new products

The E-World Is Not Enough

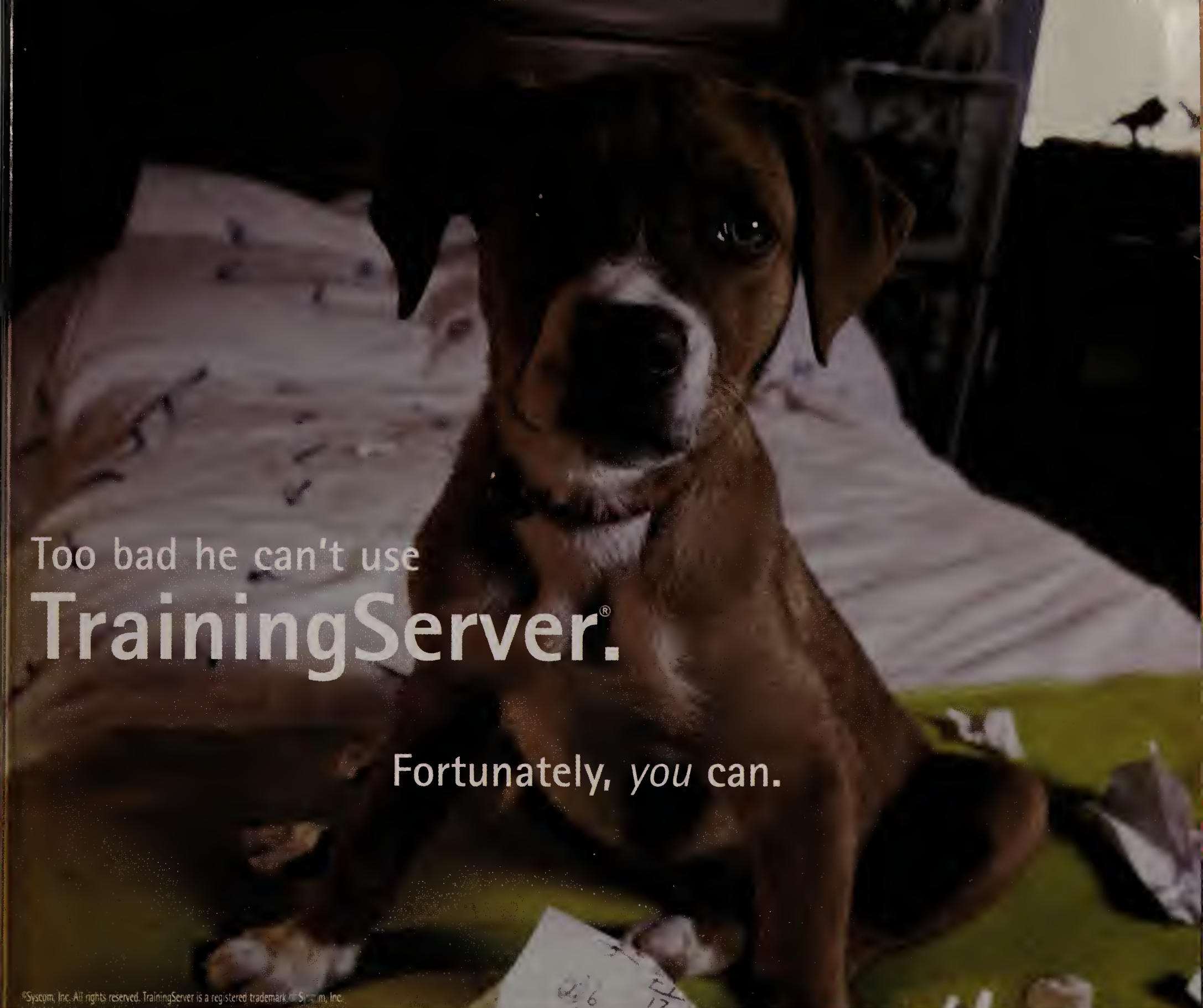
Its code name: Golden Gate. Its mission: To blindside competitors with a 1-2 punch. No, this isn't a new James Bond flick, but a new software package.

Open Market has combined its software products to create an integrated e-business solution. The objective is to catapult customers to market once they've decided to peddle their wares online.

The software suite, called **Project Golden Gate**, consists of three elements: IPS content server, which enables development and deployment of applications; Transact commerce server for online order and payment processing; and SecureLink, a sort of high-tech sentinel that separates content management from transaction processing.

Moreover, Open Market's product suite adapts to e-business's hazardous underworld. Foiling secret-agent hackers, Golden Gate enables low-priority servers to execute simple functions such as catalog maintenance, while high-priority servers secured behind firewalls handle sensitive information.

Open Market has operations in the United Kingdom, Australia, Canada, France, Germany, Italy, Japan and the Netherlands. When it comes to delivering e-business, maybe the world is enough. Pricing for the Transact server starts at \$65,000, and pricing for the IPS server starts at



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the language metaphor that had characterized 4GL technology.

Symbolically, programs were even developed that retranslated legacy 4GL code back into Cobol, where it could be more conveniently handled by newer middleware application development tools. The idea of a toolkit specialized to

particular application environments became so pervasive that 4GLs lost their own identity. In a sense, that is testimony to their ultimate success.

Fred Hapgood is a Boston-based technology writer. He can be reached via e-mail at hapgood@pobox.com.



PREDICTIONS

e-business

The End Is Near

THE AGE-OLD WARNING came over the computer screen with utter clarity. Like the wooden sign carried by doomsayers, it read, "GartnerGroup Predicts End (to e-Business)."

Not much room for misinterpretation there. Analysts at market researcher GartnerGroup in Stamford, Conn., believe 75 percent of e-business projects will fail due to inflated expectations and overzealous marketing, sending the internet economy spiraling downward. Within two years, dotcoms' shares will fall from their lofty heights, e-failures will sweep across national headlines, and investors and consumers will scatter for cover. From 2002 to 2004, people will be stuck in a trough of disillusionment. And by 2008, the lone e-business will cease to exist.

Of course, all is not lost, says Alexander Drobik, vice president of e-business transformation at GartnerGroup. "By 2004, we will see a steady slope of enlightenment as the true e-businesses emerge," he says. Rising from the ashes of this digital wasteland, a self-reliant business model will come forth as the internet's savior. This prototypical company will be built from a combination of brick and—yes!—click. It will strike the perfect balance between e-business aspirations and e-business foolishness. In essence, it will use the internet but not depend on it. And by 2010, thanks to the emergence of these businesses, the world will have triumphantly returned to electronic profitability. Stay tuned.

—Tom Kaneshige

new products

\$60,000. The integration module is free. The starting price of a typical system averages \$200,000, including servers and consulting. For more information, visit www.openmarket.com or call 781 359-3000.

Inside the Virtual Project

Welcom has delivered its version of the virtual team room. The software vendor's product, called **Welcom-Home**, enables people to work collaboratively on projects over the web.

WelcomHome acts as a central repository for all information relating to enterprisewide projects. Team members can receive up-to-date data and task lists. Project status can be monitored through milestone charts that track progress levels—it warns project managers of potential problems. The application also emphasizes control by identifying single ownership of issues and risks. In a typical 500-user license sale, WelcomHome costs less than \$100 per user. For more information, visit www.welcomhome.net or call 281 558-0514.



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ASPECT

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UNDER DEVELOPMENT
satellite router

When DSL Isn't Enough

CONTINUOUS, high-speed internet access is the dream of anyone struggling with a 56K modem. While cable modem and digital subscriber line (DSL) solutions—where available—can provide relief, the real world performance of these technologies only occasionally comes close to the breathtaking 1.5Mbps throughput of a T1 link.

With dedicated T1 connection prices out of the range of branch offices, telecommuters and many others, frustrated internet users are typically left looking to

the sky for help. And that's just what Helius, a satellite communications software provider based in Orem, Utah, hopes for. The company's Helius Satellite Router provides 24/7 internet access at speeds exceeding T1 performance.

The Helius system consists of a box-shaped receiver and pizza-sized satellite dish. The company promises a downstream throughput of up to 3Mbps, approximately 200 to 400 percent faster than other satellite-based solutions. The system connects to any LAN and is com-

patible with leading operating systems, including Windows NT, NetWare, Macintosh OS and Linux. Domestic pricing is \$2,500 for the hardware and installation, plus a \$130 per-month subscription fee that covers up to 30 users.

Helius's customers are generally small to midsize businesses in metropolitan as well as remote areas. "These companies want to get the benefits of the internet to their employees, but they don't have access to a high-speed connection," says Myron Mosbarger, Helius's president and CEO.

Davis, Nichols & Associates, a Valdosta, Ga.-based accounting and financial consulting company, was one of Helius Satellite Router's first beta testers. The company signed up for service in early 1998. The satellite technology replaced a pair of analog modems that were bound together for a theoretical 128Kbps throughput. "We felt like we were in the Stone Age," says Stuart Avera, the company's systems engineer.

Yet when Davis, Nichols & Associates moved to a new building in June 1999, the organization decided to leave the Helius system behind, opting instead for a T1 connection, which he was able to get for an unusually low fee. The drawback, Avera says, was the technology's poky upstream feed. Since the system relies on a regular phone line for outgoing data, the company continued to use its 128K modem setup for upstreaming. But the outbound flow proved to be too slow for the company, which required a faster connection in order to send large volumes of financial data to its traveling consultants. "We needed more support for outgoing traffic, otherwise the Helius system wouldn't have been replaced," says Avera. "It worked exactly as promised, and it's great for companies that don't need to send out large amounts of data."

—John Edwards

The Helius Satellite Router provides 24/7 internet access at speeds exceeding T1 performance.

CIO

P E R S P E C T I V E S

CONFERENCE SUPPLEMENT TO CIO MAGAZINE

April 16-19, 2000

Ritz-Carlton

Naples, Florida

Shipments
Gross Orders Entered

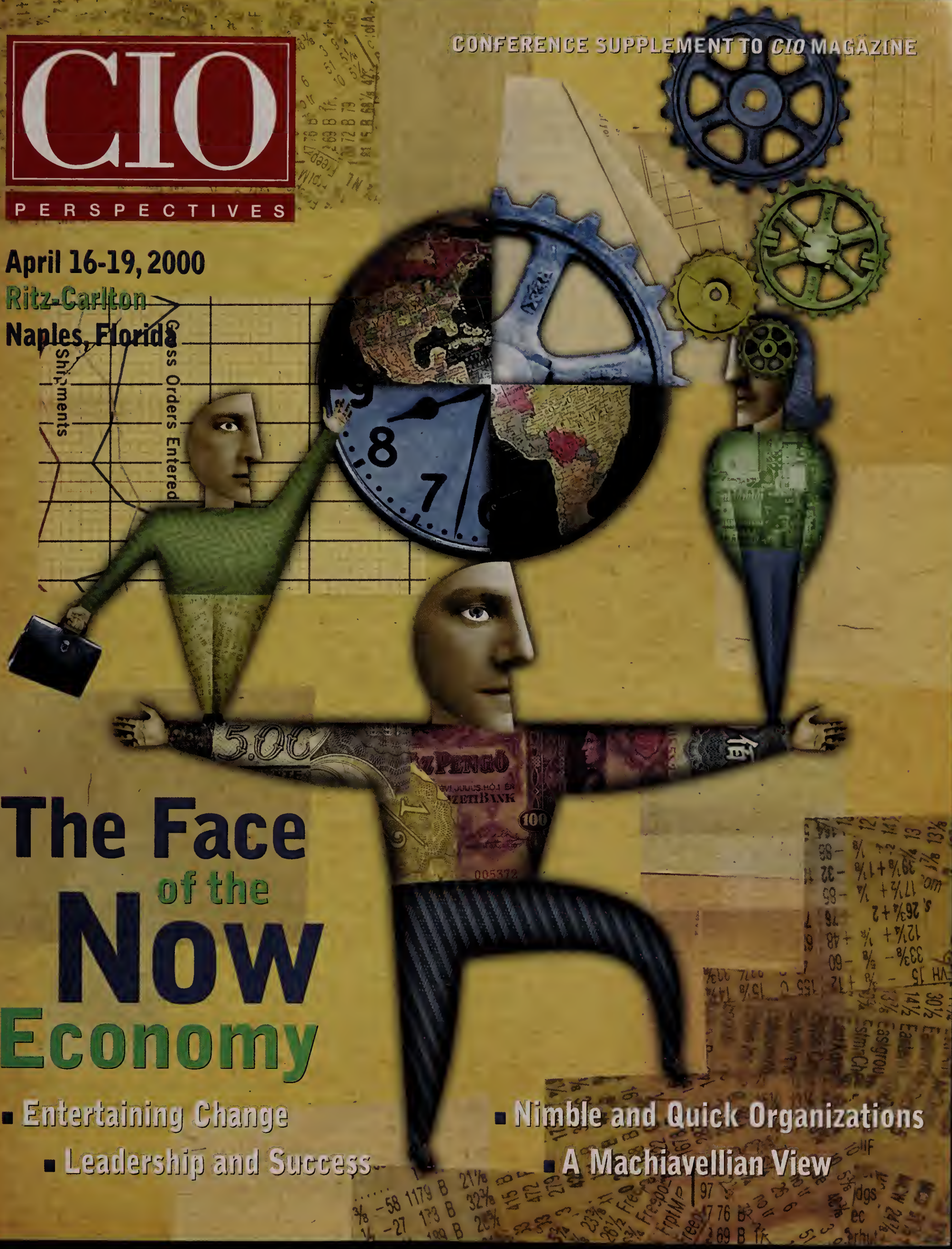
The Face of the Now Economy

■ Entertaining Change

■ Leadership and Success

■ Nimble and Quick Organizations

■ A Machiavellian View



CONFERENCE OVERVIEW



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CONFERENCE OVERVIEW

Lynda Rosenthal and Gary Beach

NOW, HOW?

Ingenuity is the Key

AGENDA

Detailed information about general sessions, business briefings, scheduled meals and activities throughout the conference.

CORPORATE HOSTS

During the conference, our Corporate Hosts, an exclusive group of innovative and visionary companies, will display a wide array of solutions and services that address your strategic and operational IT needs.

COMPANION PROGRAM

Participation in our Companion Program includes all scheduled meals, receptions, entertainment, a special companion exercise class followed by companion breakfast, and planned companion activities during conference hours. Companions may also attend the John P. Kotter and Stanley Bing keynote presentations with our compliments. The Companion Program does not include conference session attendance (with the exception of the keynote presentations), or participation in Sunday's golf tournament.

ENROLLMENT FORM

Register using our online enrollment form at www.cio.com/conferences; complete the form on the back of the brochure and fax it to 508 879-7720; or call our conference hotline at 800 366-0246.

Cover illustration by Joyce Hesselberth

We're in the midst of a new economic era, and time-honored business rules are evolving to accommodate it. We've entered the "Now Economy"—an ever-changing 24/7 online world of continuous information exchange, customized products and instant electronic transactions.

In response to the economic foundation shifting beneath them, business and IT executives are crafting bold, scalable solutions by forming new business models at explosive speed. At the same time, they are managing and leveraging intellectual capital to establish their organization's brands, patents, franchises, ideas and expertise, and its value to the enterprise and customers; and continually evolving strategies to meet rapidly changing market demands.

Join your peers at the next *CIO Perspectives*® conference, **The Face of the Now Economy**, April 16-19, 2000 at the Ritz-Carlton in Naples, FL to gain a compelling new perspective on the state of the electronic economy, and learn approaches to prepare for the (un)predictable electronic future.

General Session presentations will be given by **Justin Yaros**, CIO of Twentieth Century Fox; **Tom Woteki**, CIO of the American Red Cross; **Michael Dillard**, CIO of ClubCorp, Inc.; and **Ann Delligatta**, COO of autobytel.com inc.

Our Wednesday keynote presenter, **John P. Kotter**, author of *John P. Kotter on What Leaders Really Do*, offers insight into power, influence, interdependence and change, and spells out how executives can become more effective leaders. **Stanley Bing**, author of *Lloyd: What Happened* and his most recent work, *What Would Machiavelli Do?*, has been described as "an anthropologist of corporate culture, a satirist of corporate greed, and a comedian of the libido." Featured presenter, **Rob Rodin**, former CEO and president of Marshall Industries, Inc. and author of *Free, Perfect, and Now: Connecting to the Three Insatiable Customer Demands: A CEO's True Story*, reveals how executives should prepare for and respond to the demands of today's customers — they want the product or service for FREE, they want it PERFECT, and they want it NOW.

You will also have the opportunity to meet the executives of our Corporate Host companies during a series of business briefing sessions, and view the technologies that will propel your enterprise into the Now Economy.

To enroll in the conference, fax the attached enrollment form to 508 879-7720 or call 800 366-0246; visit our Web site at www.cio.com/conferences for the complete agenda, hotel and travel information, and the online enrollment form.

Regards,

A handwritten signature in dark ink that reads "Lynda Rosenthal".

Lynda Rosenthal
Executive Vice President and
General Manager, Executive Programs
CIO Communications, Inc.

A handwritten signature in dark ink that reads "Gary J. Beach".

Gary Beach
Publisher
CIO Magazine
CIO Communications, Inc.

April 16-19, 2000 ■ Ritz-Carlton ■ Naples, Florida



Now, How?

Ingenuity is the Key

BY TOM FIELD

We're not talking new, we're talking now — the Now Economy, that is.

We're talking not about a time that's coming, but one that's here — a new age of business powered by the Internet and measured in terms of shortened cycles and speed of delivery.

We're talking about time-honored professions that have suddenly and permanently changed because of the new electronic medium; old businesses that have reinvented themselves; and new enterprises that have arisen with new business models that command instant electronic market space.

"Companies are finally realizing

that technology is coming at them quicker and quicker, and leaders are having to make technology decisions and deliveries on shorter time frames," says **James Wetherbe PhD.**, a veteran technology observer and the *CIO Perspectives* conference moderator. In this new economic environment, leaders must harness the power of technology to transform their businesses to excel in changing times. As Wetherbe notes, "Organizations have to be more nimble if they're going to be capable of changing business processes to incorporate new technologies."

Nearly 20 years ago now, when ATMs were first introduced at banks, the financial services industry was slow to change its processes and customer

services. But the early ATM adopters, as slowly as they tiptoed into these uncharted waters, gained distinct market advantage over rivals who stayed ashore. "Companies don't even have that much time anymore," Wetherbe says. At Internet speed, organizations move now or suffer soon the immediate consequences of diminished market share. He will illustrate this point with insightful anecdotes about FedEx, which anticipated and prepared for the arrival of new technology-fired business processes, and Barnes & Noble — which didn't.

Big businesses aren't alone in their response to rapid change. Big schools, too, are reeling from the effects. **John P. Kotter**, Harvard Business School professor and author of *John P. Kotter on What Leaders Really Do*, will speak in two contexts: the first, about the companies he has observed gaining early advantage in the Now Economy; the second, of how people in his own profession — education — are perhaps moving too slowly. "Harvard Business School is essentially a division of a corporation that's 370 years old — a corporation that's been very successful," Kotter says. And while other venerated institutions have begun changing their curriculum and teaching methodologies to adapt to the Internet, he adds, Harvard has been slow to embrace change. "It's a real challenge for us to be brought into the 21st century," Kotter says. "The job of the faculty here has not changed much — yet. But we are going to have to start thinking about how we can do things differently. There are all kinds of neat possibilities."

Business and technology leaders from a variety of organizations new and established, for profit and non, goods manufacturers and "feel-good"

service providers have successfully bridged the gap between the old and now economy. Their common bond is their drive to thrive in response to unprecedented, unpredictable change.

In the "dot.com" world, e-commerce innovators are wrestling with the challenge of transforming their marketplace and their customers' mindsets. At Autobyte.com Inc., for instance, **Ann Delligatta**, executive vice president and COO, oversees an e-business that wants to change how people buy cars. But what she's found is that to achieve that goal, her company must change how it appeals to customers. "The e-consumer wants to be 'in charge' of the transaction. They want to buy, not be sold to," Delligatta says. "The successful e-commerce site will provide them with the data, the experience and the tools to do just that."

Delligatta sees organizational challenges and opportunities, the change in vendor relationships, and opportunities for cooperation and partnership with companies that might not have been considered in the past. The key internal challenge to be met is for business leaders to overcome their own barriers and misconceptions about one another's roles. "We have been talking for years about the need for tighter collaboration between business and technology leaders," Delligatta says. "The Now Economy demands that this become pro-active collaboration, with the technology organizations frequently taking the leadership role."

And don't think the leisure-time businesses are spared the pains of Now Economy transition. From the film studios to the golf courses, senior executives are facing similar tests. At Twentieth Century Fox, **Justin Yaros**, senior vice president and CIO, is in the midst of an industry — several different

entertainment industries, actually — that is seeing radical, fundamental change. Internally, Fox's business processes are moving to the Web, allowing executives greater real-time access to distributors, licensees and partners. And in each of Fox's entertainment mediums — film, television and music — the Internet is on the verge of changing everything. "It may not just change how we offer entertainment, but the very format of what we offer," Yaros says.

Digital delivery of music, interactive TV, new PC entertainment options —

stereotypical country club members — older, grayer folks who are not especially attuned to technology. But in a recent customer survey, Dillard found that his membership is much younger and more tech-savvy than anyone believed. "Over 90 percent of our members use the Internet, and Web surfing is their #2 leisure activity behind reading," Dillard says. "It turns out our members expect a lot from technology."

Consequently, ClubCorp used this customer feedback to completely reengineer its delivery of services. Dillard is building Web sites for each of the com-

"Organizations have to be more nimble if they're going to be capable of changing business processes to incorporate new technologies."

Yaros must explore all of these avenues and more. "It's definitely the equivalent of trying to hit a moving target with a weapon that hasn't been invented yet," Yaros says. He has been at Fox for just over two years, and in that time the company has changed dramatically, and so have executives' perceptions of IT. Yaros has had to adjust to a more prominent role in the company, and has had to make major technology decisions not on what systems will do, but on what they might do — and what the marketplace might demand.

Even in the leisure resort industry, where executives thought they knew everything they needed to know about their customers and their habits, new technologies are spawning new customer service trends. **Michael Dillard**, executive vice president and CIO of ClubCorp Inc., recently learned an interesting lesson about his company's 250,000 leisure resort members. Dillard and other ClubCorp executives always assumed that ClubCorp appealed to the

pany's 240 clubs and resorts, helping them to create online affinity groups of members who want to schedule leisure events or just chat. New customer relationship management (CRM) systems help club employees recognize and greet members at the door; and new chip-embedded membership cards will give members free, prepaid reign of the facilities so that they don't have to carry cash. Internally, ClubCorp is centralizing and streamlining its processes so that it can deliver better services faster. "That's the part that has to be invisible to our guests," Dillard says. "Our goal is making life better for our members and our guests. If we can use technology to do that — well, that's really the rallying cry for what we do here."

As leaders toss out many of their traditional business approaches, some traditional enterprises find themselves at a crossroads — particularly in the non-profit sector, which is insulated from the windfalls of venture capital and soaring stock values. Consider the American



Red Cross (ARC). For decades, the ARC has been a low-tech, decentralized institution whose chapters have grown up knowing distinct geographic boundaries. Yet today, with the power of the Internet, this non-profit organization's practices are being challenged. "How does an historic institute adapt to a digital environment where geography is irrelevant?" asks **Thomas Woteki**, CIO of the ARC. For the most part, his answer has been, "Slowly."

Since joining the ARC in 1994, Woteki has introduced new technologies to track data about the organization's blood business (the Red Cross holds about half the nation's blood supply), and now he is bringing the chapters together via the Internet. Yet, the seemingly simple act of taking the ARC online raises a whole new set of fundamental business questions: should the individual chapters have their own discrete sites or be part of just one, centralized Web strategy? Currently, each local chapter raises its own funds. How does that change when the geographic boundaries are removed? How does the ARC respond to competition from other health service agencies that now have access to the same customer base and can provide some of the same services? To answer each of these questions, Woteki raises an even more strategic question: "How do we leverage our logo and brand name in the context of our humanitarian and service mission?"

Most business leaders reacted to Now Economy forces; a lucky few were able to ride the wave as it broke. And then there were the very few leaders who anticipated the great change. **Rob Rodin**, former CEO and President of Marshall Industries, was one of these leaders with foresight. Six years ago, he started a revolution that saw his 53-year-old electronics distribution business transition

painfully from the old to the Now Economy. Marshall was a successful \$500 million enterprise in 1994, but Rodin and other business leaders foresaw the need to move the traditional, brick-and-mortar business online. They knew that market forces were pushing for electronic commerce, yet they had no foundation to enable it. Virtually overnight, Marshall changed its management staff, eliminated sales commissions, switched operating systems and completely reinvented itself as a business-to-business e-commerce venture. "We restructured every definition of value in our organization," Rodin says — and it was a painful transition. Yet the gain from this pain is that today Marshall Industries is a \$2 billion e-commerce leader by which other enterprises must gauge their own Now Economy transitions.

Rodin details Marshall's experience in his book, *Free, Perfect, and Now: Connecting to the Three Insatiable Customer Demands: A CEO's True Story*, and he will relate some of his lessons learned. Like any fundamental business transformation, Marshall's story is not a dispassionate one; it's personal. "I'm not a consultant; I did this to myself," Rodin says, and his is a message that resonates with other business executives who face similar situations. "People always say to me, 'It's nice to hear how scared you were,'" Rodin says. "It's a real story; it's human."

And it's repeating itself now, in every aspect of business and society around us.

Tom Field is a Senior Editor at CIO magazine. Contact him at tfield@cio.com

Bing Brings Machiavellian Influence

Ever find yourself in a business situation where you wonder, "What Would Machiavelli Do?"

Well, Stanley Bing has — many times — and he's written a new book detailing his conniving, manipulative answers.

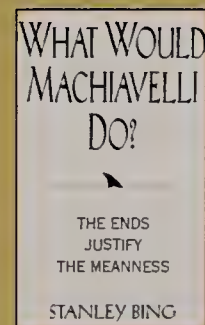
"My book is a handbook on how to get mean and nasty," says Bing, a pseudonymous New York business columnist. "Who other than CIOs could be in more need of Machiavellian assistance?"

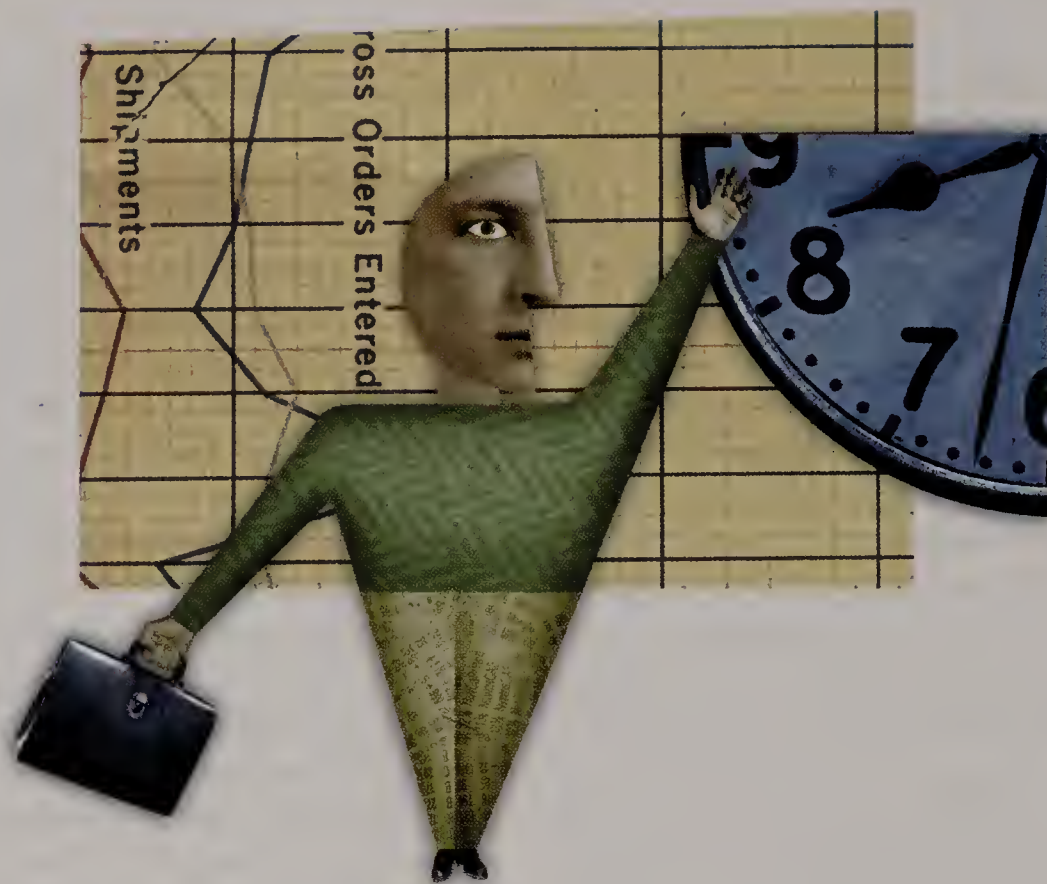
Bing, who has long chronicled the real-life business experience in his popular *Esquire* and *Fortune* columns, is no stranger to the CIO mindset. "CIOs tend to be anal-retentive types, but at the same time they're quite dreamy," Bing says. "Raging within these grey pinstriped suits are Corvette-driving, party animals yearning to burst free. These people tend to respond well to the rude comments I make."

Bing's book and presentation revolve around a common Machiavellian theme: the ends justify the meanness. Among insights Bing will share are:

- Be unpredictable
- Be a paranoid freak
- Always be at war
- Lie when necessary

"I'm the anti-Harvard Business School," Bing says, distinguishing himself from keynote presenter John P. Kotter, an HBS professor. "HBS is based on the principle that business is a rational occupation," Bing says. "I embrace the opposite." — *T. Field*





The Face of the Now Economy

APRIL 16-19, 2000 • RITZ-CARLTON • NAPLES, FLORIDA

SUNDAY, APRIL 16

11:30 a.m.

The Leaderboard Classic Golf Tournament

Hosted by Cabletron Systems, Inc. and Lockheed Martin Corporation

3:30 p.m. – 5:30 p.m.

Conference Registration

6:30 p.m. – 8 p.m.

Welcome Reception and Registration

8 p.m. – midnight

Hospitalities/Networking

MONDAY, APRIL 17

7:30 a.m. – 8:30 a.m.

Breakfast

8:30 a.m. – 9 a.m.

Welcome, Opening Remarks and KnowPulseSM Poll



GARY BEACH
Publisher
CIO Magazine

The KnowPulse (“Knowledge”) poll, an ongoing opinion poll conducted by *CIO* magazine, captures IT and business executives’ perspectives on

current topics in the news. Past polls have been covered by *CIO* magazine, as well as other prestigious media organizations, including *CNN*, *Newsweek*, *The Wall Street Journal*, and *U.S. News & World Report*.

9 a.m. – 9:45 a.m.

Organizations Must Be Nimble, Organizations Must Be Quick



DR. JIM WETHERBE
Conference Moderator
FedEx Professor of Excellence
The University of Memphis
Executive Director
FedEx Center for Cycle Time Research

Rampant technological change has led to the need for rampant organizational change. We’ve seen product life cycles shorten dramatically over the past several decades. We are now seeing that organizational business models have shorter life cycles. This has caused the need for organizations to dramatically change the way they do business, almost overnight. Wetherbe will discuss some of the aggressive approaches that need to be followed for organizations to be nimble enough to achieve quick changes as needed during these turbulent times.

9:45 a.m. – 10:45 a.m.

Entertainment — Reinventing the Industry



JUSTIN YAROS
Senior Vice President
and CIO
Twentieth Century Fox

While new media have emerged, the fundamentals of the film industry remain much the same since the first movies were made and distributed in the early 1900's. Digital technology and the Internet are leading to a complete revolution of how entertainment is created, distributed and consumed. One need look no further than the music business to see how technology can virtually overnight uproot the fundamental rules of an entire industry. The Internet and technology, along with MP3, have caught the giant recording companies sleeping and have threatened to turn them and their billion dollar infrastructures into the dinosaurs of the digital age. Yaros discusses how Fox is working to understand and prepare for both the threat and the opportunities technology represents to the entertainment industry.

10:45 a.m. – 11:15 a.m.

Coffee Break

11:15 a.m. – 12:05 p.m.

Business Briefings

12:10 p.m. – 1:10 p.m.

Luncheon

1:15 p.m. – 2:15 p.m.

Navigating in the Digital Marketplace



ANN DELLIGATTA
Executive Vice President
and COO
autobytel.com inc.

Autobytel.com has revolutionized the way people shop for and buy cars. Since its inception in 1997, the company has become the market share leader in online car sales, currently generating over a million dollars an hour. Delligatta discusses how they responded to the unprecedented expectations of the Now Economy customer, and how this translates into specific requirements for CIOs and business executives. She discusses potential organizational challenges and opportunities on the digital marketplace horizon, and offers strategies for CIOs and business executives at various stages in this evolving process.

2:20 p.m. – 3:10 p.m.

Business Briefings

3:10 p.m. – 3:40 p.m.

Coffee Break

3:45 p.m. – 4:45 p.m.

Connecting to the Three Insatiable Customer Demands



ROB RODIN
Former CEO and President
Marshall Industries, Inc.

In a world where knowledge is king, the Web never sleeps, and competitive challenge increases exponentially, Rodin reveals how

CIOs should prepare for and respond to the three insatiable demands of today's customers: they want their product or service for FREE, they want it PERFECT, and they want it NOW.



Attendees will receive a complimentary copy of his work, *Free, Perfect, and Now: Connecting to the Three Insatiable Customer Demands: A CEO's True Story*.

5:30 p.m. – 7 p.m.

Reception

7 p.m. – midnight

Hospitalities/Networking

TUESDAY, APRIL 18

7:30 a.m. – 8:30 a.m.

Breakfast

8:30 a.m. – 9:30 a.m.

Making Life Better for Our Members and Guests



MICHAEL DILLARD
Executive Vice President
and CIO
ClubCorp, Inc.

Excelling in the private clubs industry has always been about high-touch, not high-tech. Today, ClubCorp, the world's largest owner of golf clubs and resorts, is busy marrying the touch and the tech. With over 70% of its members using the Internet at least once a day, the company is challenged with finding ways to use technology to attract and retain more members and increase club usage. Innovative use of

CONFERENCE AGENDA

the Internet is one mechanism, and technology that supports smooth operations is another. Dillard discusses ClubCorp's technology strategy and presents an overview of the careful considerations required before melding high-touch and high-tech.

9:30 a.m. – 10:30 a.m.

The American Red Cross and the Now Economy: Moving One of America's Most Trusted Logos into the Digital Economy



THOMAS H. WOTEKI, PH.D.
CIO and
Senior Vice President
American Red Cross

At nearly 120 years old, the American Red Cross (ARC) is one of the nation's most trusted and respected institutions. Its logo is a symbol of hope and trust recognized everywhere. Moving the ARC into the Now Economy involves delivering its traditional services via the Internet, while protecting its most important asset—the Red Cross brand identity. Woteki discusses how the ARC is rethinking its service delivery models—the traditional geographic and institutional boundaries the ARC is having to reset (or eliminate) to meet market demands at Net speed; and the new business models necessary to compete with other “.orgs” for volunteers, donors and customers.

10:30 a.m. – 11 a.m.

Coffee Break

11 a.m. – 11:50 a.m.

Business Briefings

Noon – 1 p.m.

Luncheon

1 p.m. – 2 p.m.

A Networking Experience

An exclusive time set aside for you to meet with your peers.

2 p.m. – 2:50 p.m.

Business Briefings

3 p.m. – 3:50 p.m.

Business Briefings

3:50 p.m. – 4:15 p.m.

Coffee Break

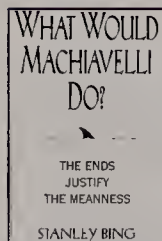
4:15 p.m. – 6:15 p.m.

Business Life Through the Prism of Machiavelli



STANLEY BING

Author, *What Would Machiavelli Do?* and
Lloyd: What Happened



How did the rich and powerful individuals who move the earth get where they are today? Are they smarter? Faster? Better

looking? Certainly not. Some are even short and ugly. What, then, is their edge? The answer is simple. They're meaner, that's all. And if you want to get where they're going, you'll be meaner, too.

Walking in the steps of the Florentine master, Bing will show you how to be all the Machiavelli you can be. How to beat people who are smarter than you are. How to make other people cringe and whimper when you enter a room. How to get what you want when you want it whether you deserve it or not. Without fear. Without emotion. Without finger-wagging morality. They do it. You can too.

Bing offers a simple, detailed plan for those with the courage to leave kindness and decency behind, to seize the future by the throat and make it cough up money, power and superior office space.

6:15 p.m. – 7 p.m.

Reception with Stanley Bing

7 p.m. – midnight

Hospitalities/Networking

WEDNESDAY, APRIL 19

7:30 a.m. – 8:15 a.m.

Breakfast

8:15 a.m. – 8:30 a.m.

KnowPulseSM Poll Results



LEW MCCREARY
Editorial Director
CIO Magazine

McCreary will present the results of Monday morning's poll.

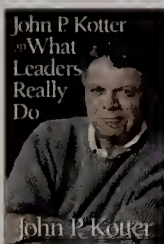
8:30 a.m. – 10:30 a.m.

Leadership and Change: Challenges in the New Economy



JOHN P. KOTTER

Konosuke Matsushita
Professor of Leadership
Harvard Business School



Author, *John P. Kotter on What Leaders Really Do*

The speed of change will continue to increase, driven by technology, globalization, increasing competition, and many other factors. Yet most of us have not been raised in a world in which non-incremental change was handled well. So we struggle. We do what we know how to do; we try to manage change. We too often miss the key ingredient — leadership. So projects move too slowly, cost too much, and give us far too much aggravation. Kotter discusses the common shape of successful change efforts and the leadership engine that drives them.

10:30 a.m. – 11 a.m.

Coffee Break

11 a.m. – 11:30 a.m.

Question & Answer Session with John P. Kotter

11:30 a.m. – 11:45 a.m.

Closing Remarks

JIM WETHERBE



Individuals need fast, easy and reliable access to the information stored in their core business systems so they can make fact-based decisions on the turn of a dime. To achieve this, the information must be presented so it can be quickly consumed, shared and acted upon by an organization's diverse group of users. Glassey presents how organizations should approach their business intelligence infrastructure for achieving maximum information value for all business channels, including the Internet. She discusses key attributes that are necessary for deploying successful e-business intelligence solutions.

IT Infrastructure Evolution: Enabling the "Anytime, Anywhere, Any Access" Business Model



JOHN ROESE

Chief Technology Officer
Cabletron Systems, Inc.
Author, *Switched LANs: Implementation, Operation, Maintenance DHCP: Automated IP Management*

Infrastructure technology is an enabler of the new Internet economy. Roese examines new and emerging technologies that facilitate a more automated model of information access to meet the needs of an increasingly mobile, diverse and demanding customer community. He addresses the increasing need for mobile access; developments in unified security access technologies; delivery of

BUSINESS BRIEFINGS

Business Intelligence: A Strategic Imperative for the e-Enterprise



KATHERINE GLASSEY
Co-founder and Chief
Technology Officer
Brio Technology

In today's e-enterprises, business executives no longer have the luxury of waiting days, weeks, or months for information they need to make decisions.

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customized transport services based on business policy and organizational structure; and using next-generation service-level management to meet customers' IT demands.

Leading Change at Now Speed



JODY DAVIDS

Senior Vice President
Information Technology
Cardinal Health Inc.

Courtesy of Lockheed Martin

With the explosion in Internet and E-commerce activity, globalization, shorter product life cycles and fierce competition, businesses must have the constant and rapid ability to change in order to keep pace with normal business growth.

To be able to meet these demands, the successful IT executive must develop a variety of approaches that improve and innovate solutions delivery to organizations where change is constant, and speed is a key requirement. The challenge intensifies when companies become excellent at product innovation and the ability to re-invent themselves in order to stay fresh and relevant.

With employment history spanning companies with two of the best-known brand images in the world, Davids offers a broad array of approaches to managing large-scale change, including sourcing strategies, partnerships, methods, tools, process reengineering, and technology utilization. She discusses these and other approaches, with emphasis on business results and impact.

Customer Interaction and eBusiness — Tying It All Together



COLLIN BRUCE

Vice President
Chordiant Software

Customers are placing increasing value on convenient access to information, products and services. In the next generation of online commerce, companies must become customer-centric to attract and retain business. They must provide consistent, high-quality service across all communication channels including the Internet, e-mail, self-service systems, call centers, and branch outlets.

Bruce details how global companies are offering customers highly personalized e-business, marketing, sales, service and support across all communication channels.

Application Service Providers: The New Utility for the Information Economy



DAVID A.G. JONES

Senior Vice President
Worldwide Sales
Citrix Systems, Inc.

What if your company could "turn on" access to applications as easily as flipping a light switch or twisting a faucet? Until now, organizations requiring software — from e-mail to ERP — had to shoulder the cost and complexity of their own computing environments. Constant upgrades, IT staff shortages, support for remote users, compatibility issues — these

are some of the challenges of in-house computing systems. The emerging Application Service Provider (ASP) industry is replacing this scenario with a simple solution: for a set fee, ASPs host applications on central servers and deploy them to users according to agreed-upon service levels. Enabling this new "utility" model is server-based computing technology that delivers fast, reliable application access over any connection to users on any type of device. Just like phone service or cable TV, applications are ready when you are.

Managing Information Across the Extended Enterprise



TERRY MILHOLLAND

CIO
EDS

As desktop computers, hallway copiers, and handheld devices evolve into two-way portals to the world of information, companies are being transformed into extended virtual enterprises where employees, suppliers, suppliers' suppliers, customers, and customers' customers exchange information on a regular basis.

Every individual participating in these extended enterprises is a data owner with a digital persona, consisting of a unique personality and specific preferences, rights, and needs for information. In tomorrow's business environment, CIOs will be faced with increasingly complex decisions regarding who owns what information, who has access to what information, and how they are allowed to use it.

**Enterprisewide E-Business:
The Case for Both Clicks and Mortar**



TONY LEACH
Executive Vice President
Operations and Services
E.piphany

The future of e-business relies on the seamless integration of an organization's e-channel with traditional distribution channels. Increasingly, companies are discovering that many customers do not want a single channel to buy their goods. They want the convenience and prices of the Web, a store and a person to talk to, someone they can reach on the phone, and even a catalog to hold in their hands.

What companies need is a system that allows them to achieve a single view of the customer to enable insight and personalized action across all touch points. Companies need to provide customers with what they want, when they want it and through the channel that they prefer. This session will discuss strategies for achieving life-long customer relationships.

**NUMA-Q: An Open Minded
Enterprise Solution**



IAN MILLER
Vice President of
Global Marketing
IBM Corporation

Miller highlights NUMA-Q enterprise-class system features and reveals how organizations can benefit from this open minded server solution. In its third generation, NUMA-Q pro-

vides the investment protection needed to preserve mission critical applications, including e-business, business intelligence, and customer relationship management solutions. With the Intel Architecture at its core, NUMA-Q has incredible flexibility, high availability, and scalability to meet fast changing business requirements while minimizing customer and partner risk.

Developing the eKnowledge Center



THOMAS MURPHY
Research Manager,
IT Advisor
International Data
Corporation

The age of electronic knowledge has arrived, and organizations in every industry sector are rushing to find ways to increase, improve, and leverage their knowledge capital. To accomplish this, companies need more than the technology. They need a strategy to organize and plan their knowledge efforts. As research manager for IT strategies at IDC, Tom Murphy recently completed a study that defines how organizations can create an eKnowledge Center. The presentation he has prepared from his data describes the role that the CIO and the IT organization can play in building knowledge capital across an organization and linking the different areas of knowledge. In the presentation, he also describes the "Left Brain/ Right Brain" concept of developing a balanced focus on knowledge across an enterprise.

The Third Generation of e-Business



**CHRISTOPHER S.
THOMAS**
Director, Strategic
Marketing, Enterprise
Server Group
Intel Corporation

The evolution of e-Business is moving at a stunning pace. The first generation of e-Business meant posting static information about your company's products on a Web site. Then came the second generation—integrating your Web site with your internal business processes to enable e-commerce across the Internet. But is your company ready for the *third* generation of e-Business?

Do you know how to improve your customer's Internet experience and empower them to make better and faster decisions? Advanced planning for this paradigm will be critical to create a competitive advantage for your company. Come hear Intel and other industry leaders' vision of the third generation of e-Business, and find out how your company's business Internet systems and solutions need to be designed to succeed in this new era.

CONFERENCE AGENDA

The Balancing Act: e-Business and the Information Backbone



ED KOEPFLER
President
Intentia Americas

Ice cream, furniture, personnel recruitment, dairy. What do these companies have in common? They figured out how to be profitable with e-business. What's their secret? They learned to leverage best practices and effective management approaches with the right information technology backbone to ensure success. Koepfler explores the strategies, implementation and payback of completing an enterprise infrastructure for the greatest impact on business and e-business.

Managing Your Firm's Mobile Intelligence – Today and in the Future



ANDREW WALSH
Partner and CTO
Ernst & Young Assurance
and Advisory Business
Services



DR. JAMES TAYLOR
Futurist and Author, *The Handbook of the Visionary*
Courtesy of Iomega

What can IT management do today to protect the mobile corporate data that resides off of the network? What concerns will they face in the next few years with the advent of the "Internet 2.0"?

Managing a mobile workforce that generates intellectual property on remote applications can be a tremen-

dous challenge. Sales, audit, engineering and finance professionals that are not tethered to the network have critical data residing on their notebooks that is virtually unprotected. Preparing for and managing a mobile workforce will be equally demanding in the future as well.

Walsh will discuss practical approaches to design, develop and implement applications and resources to prevent corporate information loss in field-based environments. Dr. Taylor discusses the implications of the "Internet 2.0," the next generation of web technology in a world where the individual is continually more empowered to construct his or her own world — wherever and whenever.

Information Continuance: Integrated, Independent and Intelligent Solutions for the Enterprise



PAUL PAYACK
Vice President, Marketing
Legato Systems, Inc.

Today, customers are telling us that they must increasingly leverage their corporate data assets to make timely and knowledgeable business decisions. To do so, they require a solution that is complete, open and integrated. However, all too frequently, data and applications are still managed independently. As a result, businesses are having difficulty scaling their information systems across a variety of platforms — and across their enterprise. And the steadily shrinking "backup window" further impedes their ability to implement

time-critical decisions.

Payack discusses how businesses must manage data movement across the enterprise to make the most of their data assets and enhance customer value. He explains how to deploy the infrastructure and technology necessary for effective management of data movement.

Connecting E-Business to The Business



SCOTT STONE
E-Business Vice President
Lucent Technologies

Whether you are an established company looking to transform your business through an e-Business program or a new online venture looking to link to real-world logistics and fulfillment, all enterprises face a growing need to integrate Web-based customer interactions into the physical world — and its existing systems environment. This includes rapidly emerging requirements to integrate intelligent communications networking with e-Business strategy.

Stone discusses the cutting-edge technology that allows enterprises to establish their e-commerce infrastructure as a competitive asset. He discusses the differences in deployment for enterprises with the need for legacy system integration versus green field implementation, and how both approaches can lead to competitive differentiation.

Creating a Business-centric Model of the Enterprise Network

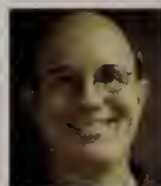


BOBBY LIE
Senior Vice President
Fidelity Investments
Courtesy of NetScout

The cost to deploy and maintain a network infrastructure is ever increasing. The cost increase is driven by the need to facilitate a wave of new applications in support of e-business such as Web call centers, video streaming and on-line trading. While end users perceive network bandwidth as a free commodity, the spiraling cost of network usage continues to escalate from 30 to 75 percent a year.

To address this business need, Fidelity Investments recently deployed a Usage Based Billing system, a framework for monitoring the amount of resources consumed by customers and billing them accordingly. Lie discusses how within the first year, Fidelity achieved an ROI of 500% as well as other productivity gains such as increased application responsiveness, capacity planning, and improved relationships with information technology customers.

From CIO to CEO: How ITM Places the CIO at the Business Strategy Table



JOHN CIMRAL
CEO
ProSight

What does "CIO" stand for? Judging by the impact of IT on the business, it should be "Chief Influence Officer." Almost every major business initiative contains a significant IT component. However, every functional area has had an enterprise application to manage themselves like a business, except IT. The burgeoning market for IT Management (ITM) Solutions fills this void. Cimral discusses how ITM allows the CIO to manage the IT asset like an investment portfolio, and proactively drive IT budgeting and strategic planning processes. He will also reveal how one of the most respected companies in the world uses ITM to ensure that IT investments are aligned with business objectives, and that business unit stakeholders have a full appreciation for IT investment decisions.

Automating the Entire Online Process - From Order Entry to Fulfillment: A Case Study



DOUG BROWN
Director of Operations
Periodical Publishers' Service Bureau
Courtesy of Xerox

It appeared automated, but behind the scenes the old process was expensive and labor intensive. Once an order was received via e-mail, it was re-keyed into a transaction processing system, credit card transactions were processed by hand, and the fulfillment house received instructions via hard copy, computer tape or e-mail.

Sound familiar? It's a challenge to leverage electronic commerce opportunities, integrate on-line technology with legacy data systems, keep customers satisfied, management delighted and costs down — but it can be done!

Brown will "Share the Knowledge" on how he partnered with Xerox Connect to develop a solution that integrates PPSB's on-line ordering process with its back-end transaction processing systems to support their multimedia Newsstand Web site (www.mmnews.com).

Business Briefings also presented by:

Cable & Wireless
GTE Internetworking
Hewlett-Packard
Information Builders, Inc.
Nortel Networks
Symantec



CONFERENCE HOSTS



Incorporated in 1989, **Brio Technology, Inc.** (Nasdaq: BRYO) is the only business intelligence software provider to offer a complete platform that addresses the full range of decision processing needs and contributes to the overall business performance of today's Web-enabled e-enterprise.

The vision behind the company's flagship platform, Brio ONE, is to provide customers with the broadest range of business intelligence capabilities for users and information sources.



CABLE & WIRELESS

With customers in 70 countries, **Cable & Wireless (C&W)** is a major global telecommunications business with revenue of approximately \$14 billion in the year ended March 1999 and over 50,000 employees. C&W offers a range of services spanning broadband data and Internet services, fixed and mobile voice, as well as interactive entertainment and information. Since November 1998, it has announced major investments in advanced networks in the US and Europe, the restructuring of Cable & Wireless Communications in the UK and has acquired full control of Cable & Wireless in Japan to support this strategy. Visit us at www.cableandwireless.com.



Cabletron Systems — a recognized leader in high-performance networking solutions — has provided reliable LAN, WAN, ATM and remote access communications to millions of people throughout the world. Among its many customers are Fortune 1000 companies; service providers and telcos; federal, state and local government agencies; universities and academic institutions; health care and financial institutions; small businesses and more.

Through its award-winning technology backed by an unrivaled service and support organization, Cabletron delivers scalable solutions that support today's mission-critical applications while lowering the total cost of network ownership and maximizing a customer's return on investment. All of which makes Cabletron your *e-business communications specialist*.™

To learn more call 603 332-9400 or visit us on the Web at www.cabletron.com.



Chordiant Software builds customer relationship management applications tailored for business-to-consumer companies, serving traditional and e-business environments, with a single view of the consumer.

Unlike Web-only and customer relationship point solutions, Chordiant's flagship product, Chordiant CCS — Customer Communications Solution — embraces new customer communications methods while leveraging existing ones.

Chordiant unifies Web, branch and call centers through a single customer model that integrates all services, offerings and business goals. As a result, Chordiant allows enterprises to retain customers and grow revenue by enabling more sophisticated relationships.



Citrix Systems, Inc., (Nasdaq: CTXS), headquartered in Fort Lauderdale, FL, is the global leader in application server software and services that offer "Digital Independence™" — the ability to run any application on any device over any connection, wireless to Web. Citrix is one of the world's fastest-growing software companies, with more than 100,000 customers, including 99 of Fortune 100 firms. Its products include MetaFrame™ software and Independent Computing

Architecture (ICA) technology. Citrix was recently named to the Standard & Poor's 500 Index.



EDS is a professional services firm that applies consulting, information and technology in innovative ways to enable clients to improve their overall performance.

Through an "end-to-end" portfolio of services that includes all aspects of electronic business, EDS is the provider of choice for thousands of leading businesses and governments around the globe. EDS' business is making clients more successful. The company works with its clients to extend their enterprises and catapult them ahead of the competition. It provides thought leadership and creates measurable value by unleashing the full potential of information and technology.

For more information about EDS, please visit www.eds.com.



E.piphany is the leading provider of Web-based Enterprise Relationship Management (ERM) solutions. E.piphany's vision for ERM is to build customer intimacy by closing the loop between everything known about a customer and every action taken in the

course of the relationship. E/4, the company's flagship ERM platform, extracts information from existing databases and front-office applications, analyzes it, and presents it in a company's language using a simple "Yahoo-class" user interface to reach everyone with a need to know. E.piphany helps companies create unbreakable lifetime relationships. These are high impact, high return on investment opportunities, and solving them has an immediate effect on profitability.



INTERNETWORKING
POWERED BY BBN

GTE Internetworking, a unit of GTE Corporation (NYSE: GTE) offers customers, from consumers to Fortune 500 companies, a full spectrum of integrated Internet services using IP networking technologies. GTE Internetworking delivers complete network solutions, including dial-up and dedicated Internet access, high-performance Web hosting, virtual private networks (VPNs), managed Internet security, network management, enhanced IP services, systems integration and Web-based application development for integrating the Internet into business operations. More about GTE Internetworking can be found on the Internet at www.bbn.com.



Hewlett-Packard Company (HP) is a leading global provider of computing and imaging solutions and services for business and home. HP capitalizes on the opportunities of the Internet and the proliferation of electronic services. We are the second-largest computer supplier in the world, with 83,200 employees worldwide and had total revenue from continuing operations of \$42.4 billion in 1999 fiscal year.

HP is extending its leadership in enterprise computing to the Internet marketplace, specifically in the areas of e-services and digital imaging. HP will enable the vision of e-services via partnerships and ventures of its own in the areas of apps-on-tap, which is pay-as-you-go software and e-services portals.



IBM NUMA-Q, formerly Sequent Computer Systems, is the leader in scaleable Intel-based server solutions for e-business. IBM NUMA-Q platforms and services are optimized for the scalability, availability and manageability requirements of large and rapidly growing e-business infrastructures. There are more than 10,000 NUMA-Q and NUMACenter installations worldwide, including some of the world's largest and most sophisticated business intelligence, CRM and ERP environments. For further infor-



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mation, phone the IBM NUMA-Q at 503 626-5700 or 800 257-9044 or visit our Web site at www.ibm.com/servers.

Information Builders.

Information Builders (IB) is one of the world's largest independent global software companies, with offices around the world and revenues in excess of \$307 million in 1998.

IB simplifies how organizations access, understand and share information by providing solutions to integrate disparate data and transform that data through Web business intelligence software into timely and valuable information. Visit our Web site at www.informationbuilders.com to learn more about our products and services.



Intira Corporation is a pioneer and leader in Netsourcing — the outsourcing of IT and network infrastructure for mission-critical e-business applications. Intira markets its turnkey Netsourcing services to Fortune 1000 enterprises, aggressive high-growth Internet-based businesses, traditional media/entertainment companies, application service providers and ISVs. For more information visit Intira's Web site at www.intira.com.



International Data Corporation (IDC) is a leader in delivering reliable and insightful IT data, analysis, and opinions. Founded in 1964, this world-wide organization employs more than 500 industry analysts who cover the full spectrum of technology and management areas. Rigorous primary research, unsurpassed knowledge of IT suppliers, in-depth competitive views, innovative negotiating tools, broad technology coverage and on-point analysis combine for a powerful resource, providing you with practical, real-world analysis and advice. In a rapidly changing technology market, IT professionals rely on IDC for clarification, validation, and guidance in their tactical and strategic IT decision making.

IDC delivers all this value in a one-stop research and advisory service that provides IT professionals with unrivaled convenience, cost savings and flexibility. IDC's 35 years of experience and knowledge as the watchdog of the IT industry can help you realize maximum value and ROI from the dollars you spend applying IT to business strategy.



When **Intel** introduced the micro-processor in 1971, it forever changed the way business worked. Since then, Intel has evolved to become a key building block supplier for the Internet economy, delivering core technologies for servers, clients, and networks. Today, companies incorporate Intel® Architecture-based solutions across their entire business and IT environments. Within these corporate infrastructures, Intel Architecture-based servers continue to lead the way in price/performance, flexibility and choice. Find out more about Intel's latest server technologies at www.intel.com/eBusiness/server/resources.

intentia

Intentia International is one of the world's leading suppliers of Enterprise Applications to companies that manufacture products in discrete and process environments. Intentia is an ISO 9000 certified software developer and worldwide IBM development partner for the IBM AS/400. Our Enterprise Application, Movex, is designed to improve the underlying business processes within distribution and manufacturing companies, in the areas of logistics, production, distribution and finance. Available in 24 languages, Movex is implemented in more than 4,000 sites worldwide. Intentia ranks among the top 10



worldwide ERP, supply chain solutions providers and has more than 3,000 employees in 40 countries around the world. For more information on Intentia and Movex business applications, please call 1-800-SW-MOVEX or visit us at www.intentia.com.



Iomega Corporation, a leader in smart, portable storage solutions, manufactures and markets the award-winning Zip®, Jaz® and Klik!® drives and disks and markets the ZipCD® CD-RW drives and discs that help mobile and desktop users in business, government and education to organize, manage, create, exchange and share their important information. Iomega Corporation can be reached at 1-800-MY-STUFF (800-697-8833), or on the Web at www.iomega.com.



Legato Systems, Inc. (NASDAQ: LGTO), is a worldwide leader in enterprise storage management software. Helping companies leverage business-critical, corporate data assets, Legato's continuum of products and services enable information continuance, a seamless approach to the movement, management and protection of data throughout an enterprise. Founded in 1989, Legato's storage management software products have become the recognized industry standard with the largest installed base representing over 65,000 customers. Legato's products are available through a network of Legato-licensed resellers, integrators and OEM partners. Legato's corporate office is located at 3210 Porter Drive, Palo Alto, CA 94304. Telephone: 650 812-6000.



Lockheed Martin Corporation has emerged as the business and technology solutions partner of choice for clients who demand competitive, value-added innovation in their information systems. With \$5 billion in IT sales and more than 45,000 information professionals worldwide, Lockheed Martin offers business and IT architecture services, applications and systems integration, and information processing operations for commercial and government customers. Our experience spans 30

years of information management for clients in markets such as retail, manufacturing, distribution, health care, finance and insurance, as well as state and local governments.

Lucent Technologies
Bell Labs Innovations



No company in the world is positioned as well as **Lucent** to take businesses into the future. Through legendary Bell Labs innovations, unparalleled experience in voice and data networking, Lucent offers the most comprehensive portfolio of end-to-end communication solutions and mission critical applications to advance your business today. From the network to the enterprise to your fingertips, Lucent delivers technology and business solutions to help you get closer to your customers, partners, and suppliers. For more information visit www.lucent.com/enterprise.

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NetScout Systems, Inc.

(NASDAQ:NTCT) is the leading provider of business-oriented network management solutions. NetScout enables large enterprises to depend on their network to deliver business-critical applications in areas such as e-commerce, enterprise resource planning and supply chain management. Based on its unique Application Flow Management technology, NetScout's solutions address network optimization and fault isolation, capacity management, application performance measurement and reporting, and usage-based billing. NetScout is headquartered in Westford, Massachusetts.



Nortel Networks works with customers worldwide to design, build and deliver communications and IP-(Internet Protocol) optimized networks — Unified Networks that create greater value for customers worldwide by delivering integrated network solutions spanning data and telephony. Customers include public and private enterprises and institutions; Internet service providers; local, long-distance, cellular and PCS (Personal Communications Services) communications companies; cable television carriers; and utilities. Nortel (Northern Telecom), one of the world's largest suppliers of digital network solutions,

and Bay Networks, a leader in the worldwide data networking market, merged in 1998 to create Nortel Networks. Bay Networks is a wholly owned subsidiary of Nortel Networks. Core competencies include: large-scale design and implementation; global network sales, service and support; technology innovation and application; account and distribution channel management; customer partnering; and management of globally diversified resources.



ProSight is a leading developer of enterprise Web applications dedicated to enabling IT to revolutionize the way organizations manage themselves. ProSight offers the ProSight System, a packaged analytical application anchored by eIT-Enablert™ Web based enterprise application software. The system provides a Web-based solution to drive alignment between IT and the business, plus dynamic reporting for critical areas like IT portfolio investment strategy, risk assessment, resource allocation, project status and performance measurement. The software is implemented with IT-Solution Modules™, which are complemented by an exceptional implementation team, eIT-Pathways™. The company maintains its headquarters in Portland, OR and can be reached at 503 531-9121 or on the Web at www.prosight.com.



Symantec, a world leader in Internet security technology provides content security solutions to enterprise organizations and helps companies manage and support workforces that use computers and other mobile devices.



Xerox Corporation is the leader in the worldwide document market, providing solutions that enhance our customers' productivity. The \$19 billion company is headquartered in Stamford, CT. Xerox's solutions and systems are designed to help offices around the world capture, share and use knowledge. The company has unparalleled expertise in the document space — both paper and electronic — and provides industry-specific, global document solutions, based on its hardware, software, network and consulting services.

The Ritz-Carlton

NAPLES, FLORIDA



Resting on the northernmost tip of the Everglades, The Ritz-Carlton, Naples is a favorite destination rich in tropical splendor. Either from your own private balcony or within the hotel's Mediterranean architecture, you'll enjoy the flowered courtyards and verandahs overlooking rose gardens and lush mangroves, or absorb the relaxing views of the Gulf of Mexico.

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STATE _____

ZIP CODE _____

PHONE _____

FAX _____

E-MAIL _____

COMPANY WEB SITE ADDRESS _____

WHAT IS YOUR INDUSTRY? _____

WHAT ARE YOUR ORGANIZATION'S ANNUAL REVENUES OR ASSETS? _____

WHAT IS YOUR ANNUAL IT BUDGET? _____

YOUR NAME AS YOU WANT IT TO APPEAR ON YOUR BADGE _____

NAME OF COMPANION (IF PARTICIPATING IN COMPANION PROGRAM) _____

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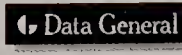
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Difference Engine

The Social Impact of Technology

Buckle Up

Safety instructions for a speedy life

BY DAVID SHENK

I. TRUE STORY. On a cloudless morning near the dawn of the information revolution, a youngish senior executive of a surging Seattle-based software company trots on board an airliner, takes his seat, buckles himself in. A few minutes later, a pleasantish elderly woman comes aboard and sits down next to him. Engines churn, safety instructions are parceled out—"In the event of a loss of oxygen, an unexpected water landing..." and so on. The plane taxis, takes flight, climbs to a comfortable cruising altitude. The passengers relax, loosen their collars and ties, settle in. This young man was raised to be polite to all strangers; he makes some friendly small talk with his seat neighbor. They go back and forth. "Some nice



weather today," "Where are you headed?" and so on—and then: "What business are you in?"

"I work for a firm that designs software for the internet," explains the fellow.

"Oh, I see," says the woman. "You're in the *artificial urgency* business."

II. It's plain to see that something extraordinary is happening to human society and how we communicate with one



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another. In considering how far and fast we have leaped into the future in recent years, forget for a moment about receiving e-mail on your cell phone; forget about RealAudio and RealVideo; forget about Yahoo and the price of Yahoo stock. Think instead about the long century of the unanswered phone.

The telephone first came into use around 1900. In 1986 I was a sophomore in college. When I called home to say hello

We are simultaneously entering an Age of Information and an Age of Distraction.

to my family, if no one was at home, the phone rang and rang. After four or five rings, I'd hang up. If mom called me and I wasn't in my room, the phone would ring and ring, and then she would hang up. Neither of us would have any way of knowing that the other had called. Ringing and ringing and then hanging up and trying again later was a way of life for advanced civilization for a long, long time. On campus, friends routinely missed the chance to meet up with one another because of the unanswered phone. To combat this problem, we used markers and posterboard on dorm doors: "D—Meet me at The Gate at 11–H."

It's not two decades later, and we're already in a different communications eon. Missed contact is now the rare exception—the occasional e-mail that drops into a black hole. Now, ordinary life is me tracking down my wife in the middle of Prospect Park to arrange the details of dinner or ask her opinion of a sentence fragment. Ordinary life now is me getting an e-mail from high school students in the Netherlands who need a reply that day, please, for a report they're writing. Ordinary life now is my mother in Ohio getting home from work and finding a digital picture of her granddaughter waiting for her—taken that same day in New York. With voice mail, e-mail, pagers, cell phones, fax machines and FedEx, there are no more missed messages or impressions. People who want to reach us know just how to find us.

Which is also the problem. A wired–wireless world is a world saturated with contact and stimulus. Phone calls get interrupted by call-waiting, work by incoming e-mail and top-screen messages. Rarely now are we unreachable by phone; in fact, we have to take special care to turn it off in churches and theaters. Fax machine bins and voice mail

boxes fill up as fast as we can empty them. And then there are all the new and interesting ways that our attention is being flagged by people we don't particularly care to hear from—advertisers zeroing in on every opportunity to capture our eyeballs and attention for a split second. With marketing, it's a particularly vicious cycle: The more overloaded we get by stimuli, the more desperate they get to find new ways to grab us. All of commercial media becomes louder, more vulgar, more manipulative.

The paradox, then, is that we are simultaneously entering an Age of Information and also an Age of Distraction. Life moves faster and is more electronic and thrilling; our conversations and attention spans get shorter. Our willingness to wait for things dissipates. Our patience wears thin, and our ability to think skeptically gets short-circuited by the hypnotic speed. One harmless diversion after another begins to fill up most of our waking moments—advertisements on sidewalks and umbrellas and stickered fruit; flickering "free stuff" banners on the net; television screens in every lobby and every restaurant and every airplane and even in subways and taxicabs (coming soon). When you add all of these harmless diversions together, pretty soon they're not harmless anymore, and they're not diversions. *They are your life.* The long conversations, the peaceful moments, the poetry and prose that spark your imagination, the spiritual times of reflection: these are now the sideshows of life, the odd, unexpected flashes.

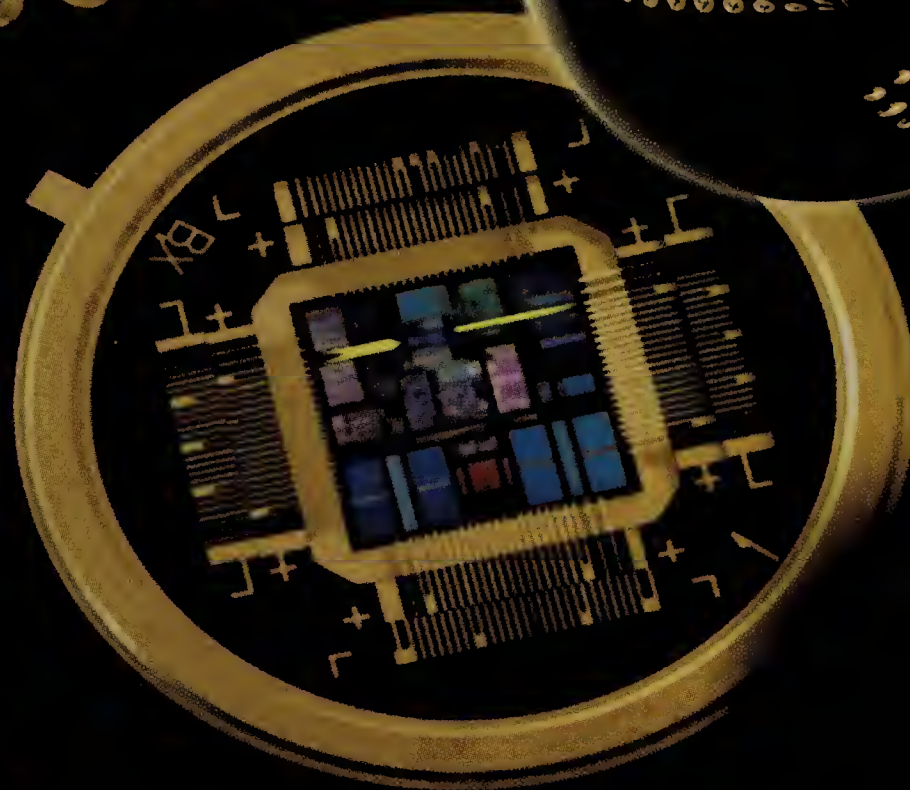
III. I've written two books about this strange paradox. The most recent was reviewed in the online magazine *Salon* not long ago, along with James Gleick's book *Faster*. The reviewer made a special point of demonstrating how dis-

When you add all of these harmless diversions together, pretty soon they're not harmless anymore, and they're not diversions.

tracted she was. Here is how it began:

"In the course of conceiving this paragraph, I checked my e-mail three times and fired off four responses. I took a phone call, visited a few websites—simultaneously, I might add, on two computers—and perused some posts on an online bulletin board. I snuck a peek at the latest news wires, gobbled some take-out Thai food, read a press release. I did this all while switching back and forth between two internet radio stations, which I listened to through headphones."

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Needless to say, the reviewer is happy with her frenetic lifestyle—she went on to disagree with my concerns (and Gleick's) about the unexpected drawbacks of the faster-paced, multitasking life. But her opening paragraph reminds me of those diet commercials that boast how many special chocolate shakes you can drink in a day and still lose weight. Sure, you can get through life with that kind of distraction, and it can be a pretty thrilling ride. And I suppose you can

It's going to require some real effort to take part in the exciting opportunities of the information sphere without being lulled into a thrilling but hypnotic lifestyle of high-stim distraction.

conceive of an opening paragraph to a book review while doing all those things at the same time. But is that really something to brag about? Is such distraction really the hallmark of success?

IV. I have no interest in nostalgia. I am not looking to the past as a place where we should want to go, but to the future as a better place for all of us. I believe in progress. I believe in technology making our lives cleaner, longer, cheaper, with more freedom and more choices. But I also think we're seriously at risk here of making a great many trade-offs for these benefits, at risk of trading away some of our real rich pleasures, some of our core values: community, conversation, shared experience, imagination and creative thought.

Distraction is now a part of our landscape, I believe, and it's going to require some real effort to take part in the exciting opportunities of the information sphere without being lulled into a thrilling but hypnotic lifestyle of high-stim distraction. We need to try to make some disciplined decisions for ourselves that go beyond the moment. Here are a few guiding principles:

1. Avoid news nuggets.

The dirty little secret about the information revolution, as marvelous as so many of the new opportunities are, is that most of the new mass-media content falls into the suspect realm of "infotainment." It turns out that sensational news programming is one relatively cheap way to capture eyeballs, and the faster the news comes, the more exciting it seems. Matt Drudge, a worthy contributor to this genre, has aptly named it "hyper-instant news." I call it "news nuggets." Whatever you call it, infotainment updates usually turn out to

be much more about entertainment than educating consumers. Of course there are new events worth paying attention to every day, but if there's one main problem with the way adult Americans apportion their information time these days, I think it is how they try to keep up with the minute-by-minute (CNN) at the expense of more thoughtful journalism (*The New Yorker*).

2. Beware "shock-jocks" and "shockumentaries."

One sure-fire way to capture eyeballs and eardrums in today's crowded data sphere is to do or say something shocking. Usually, the extra dose of gore or the surprisingly invisible blouse is just a marketing trick. The more sensationalistic the presentation, the less worthwhile it is going to be.

3. Information is not knowledge.

We all get caught up in the thrill of being connected every day—but it's important to constantly distinguish between what is merely thrilling and what is nourishing. For all of the hype about new "interactive" technology, the most important interactions going on are between our ears. It's the rich web of connections we're making in our brains that are going to come back to make us more productive and interesting people.

4. Convenience is not simplicity.

"User-friendly" technology does not simplify the life of the user. If people want to live truly simple lives, they should avoid buying complex machinery, period. And even if you're a gadget fan (as I am), it pays to be careful not to buy a machine with any more features than you really desire. A phone with twice as many capabilities as you actually want is likely to be twice as expensive, twice as complicated to navigate and at least twice as likely to break down.

If we do not strive for some discipline, the weeks and months and years will go by and we'll all look back and be disappointed. We'll see a lot of buzz and not many meaningful moments to savor. Technology is supposed to serve humanity, and not the other way around. That's a point worth keeping in mind as we take our speedy ride into the future. **CIO**

David Shenk (www.bigfoot.com/dshenk) is author of *Data Smog: Surviving the Information Glut* (Harper-Collins, 1997) and *The End of Patience: Cautionary Notes on the Information Revolution* (Indiana University Press, 1999). How do you view IT's impact on our lives? Let us know at difference@cio.com.



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Laurie lowered her insurance rates by visiting her company's Intranet site.



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Opinion | Reality Bytes

A Cold Look at Hot Trends

E-Mail v. Smoke Signals

In which the one is compared to the other and the former is found wanting

BY DAVID ROSENBAUM

THROUGHOUT THE AGES Homo sapiens have developed many excellent ways to communicate. As to which ones are superior, it's difficult to say. All can be measured against certain criteria. A good communications system should be easy to use, clear, secure, scalable and accessible. It should bring people together, not divide them. It should exalt the human spirit, not degrade it.

The spoken word, of course, is hard to beat. Most people have easy access to it, and it can be pretty secure if you whisper. Conversely, you can use it to stir a crowd, as both Marc Antony and Vince Lombardi did with great success. It binds nations together. Take the French, please.

Over great distances, however, the spoken word fails. Which is why we have telephones. Of course, the telephone has its limitations. Once you eliminate expression and gesture, the error curve rises, which is why trying to break up over the phone is such bad form. Moreover, the telephone is not terribly scalable. Try setting up a conference call.

The list goes on: Semaphore flags are excellent aboard ship as long as the day is sunny and the captain sober. Carrier



pigeons convey their messages over great distances with a high degree of security unless they encounter a hungry hawk or a crack marksman.

On one matter, however, we can agree: Nothing is as bad as e-mail.

The Way It Was

But e-mail, you protest, is the very lifeblood of business today. E-mail keeps us connected, informed, wired. How could we manage without it?

A better question is, How long can we afford to keep using it?

Let's try to remember how it was.

Before e-mail, we did not begin our days by plowing through spam: ads telling us how to make a fortune on the internet; memos asking us to contribute to uncertain chari-

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ties; poems and puns and predictions about this or that dire new bug or virus. We spent those first precious minutes in the office connecting with our colleagues, not scanning wire stories about the decline in software sales in Bora-Bora.

Before e-mail, when someone received a promotion, we stood up and walked across the office to shake their hand. Long overdue, Sue. Way to go, Joe. Can I have your office now that you're moving upstairs, Claire? And Claire, Joe and Sue knew that, no matter how insincere, we had at least made an effort. Now we shoot the lucky sons of guns a con-

e-mail hollow. Let's look at the aforementioned criteria:

■ **Ease of use** To send e-mail, you need a computer, a provider and an internet connection. To receive e-mail, you need the same stuff. To send smoke signals, you need a fire and a blanket. To receive them, you need eyes.

Winner: Smoke signals.

■ **Security** As our IS people continually remind us, and as Bill Gates learned to his dismay, everything we commit to e-mail is accessible to anyone who wants to read it. Smoke signals, on the other hand, were a complete mystery to the U.S.

Before e-mail, managers used to spend time with the people they managed, learning about them, getting to know them, having conversations. Now our businesses are managed by strident, bold e-memos.

grats that jingles and mingles with all the others in their inbox until it gets sent to the trash can.

Before e-mail, when we had something to say about a business issue, we thought about it. We considered it. We mulled it over in what used to be our unmediated, unwired minds. We consulted other people and maybe we even jotted down a few thoughts on a piece of paper, looked at it, crossed out a beau mot and substituted a better one. Then, at a meeting or in someone's office, we looked a fellow human in the eye and said our piece. Now, we hit reply, dash off a few thousand ill-considered words, cc everyone we can think of from the boss to the guy who stuffs the mailboxes, and spend the next month trying to repair the damage while the server groans under the weight of hundreds of equally ill-considered responses.

Before e-mail, managers used to spend time with the people they managed, learning about them, getting to know them, having conversations. Now our businesses are managed by strident, bold e-memos while their manager-authors cringe in their offices, terrified lest someone, one of those strangers who work for them, actually poke their head in and want to have a chat.

How did we manage before e-mail?

Very well, thank you.

The Great Debate

Scrolling through the ages, it's not hard to find communication systems vastly superior to e-mail. During the middle of the 18th century, for example, the Native Americans of the Great Plains developed a system—smoke signals—that beats

Army, which is why Sitting Bull was able to assemble thousands at Little Bighorn while Gen. Custer was busy preening.

Winner: Smoke signals.

■ **Scalability** With e-mail, you can copy everyone in your address book, but if they're not already there, you have to find their addresses, then copy them into the cc field. Smoke signals can be read simultaneously by the whole state of North Dakota without doing anything special.

Winner: Smoke signals.

■ **Clarity** With the possible exception of mime, no medium has led to such confusion as e-mail. There's also the danger (you've done it; I've done it) of accidentally sending a message to A when you meant to send it to B. Smoke signals are never misunderstood.

Winner: Smoke signals.

Need we go on? Smoke signals emblazoned their messages on the very arc of heaven itself. E-mail keeps our eyes glued to the aptly named terminal. For that reason alone, smoke signals are a clear winner.

What, finally, is e-mail good for? It's good for keeping in touch with friends and relatives with whom we have no wish to speak. It's good for reading the jokes that your old buddy in Philly has sent you (and a few hundred of his most intimate friends). It's good for receiving ads for things we don't need.

Do these things exalt the human spirit? I suggest they do not. **CIO**

Managing Editor David Rosenbaum doesn't know he can be reached at drosenbaum@cio.com.



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Engaging the IT Department

BY BARBARA MOSS

I HAVE ALWAYS viewed the IT department as an important element of any successful business strategy, not just a support service for the rest of the company. So much of what IT does plays a direct role in our ability to add customer value and execute plans efficiently. And when IT transitions into the external technology role, it is clear that it can become a critical component in the design of businesses built for speed and reliability.

When I came to Alliant in August, the IT department was typical of what you might find at any large company. The people in it were largely competent, but they were out of the corporate mainstream, and they tended to focus on technology rather than on how to use technology to make the company more successful. We delivered systems that worked, but we didn't work to integrate those systems into the corporate strategy. But our CEO, Earl Mason, had constructed a new strategy for the company that made the single most critical element of our success our ability to move information among suppliers, our warehouses and our customers. We weren't going to simply use technology. We were going to integrate advanced technological solutions into every aspect of our business relationships.

With a catalog of 180,000 products and 200,000 customers, that wasn't an easy job. But we clearly understood that business-to-business electronic commerce didn't mean building just another pretty website. We knew that the back end of our process—our ability to manage the supply chain and keep it current with a continual flow of customer and supplier data—was of equal importance. We already had in place the third critical element for a profitable B-to-B e-commerce business, and that's the warehouse and distribution infrastructure. In other words, we had the bricks and we were now adding the clicks.

That meant a number of things for our department. We brought in a few key people from outside the company who had specialized experience and skills to help guide our progress. We also told our staff that this would be their chance to show what they could do. And we learned that people who live and breathe technology are eager to do that. Once we freed them from thinking only about how to keep our internal networks going, it was all I could do to hold them back. I hear about those internet startups where people virtually camp out in the office. Well, that kind of thing suddenly started happening at Alliant. It was amazing and exciting, and it's proof that you don't have to be a Silicon Valley startup to be part of the e-commerce wave.

As proud as I am of our people, I also recognize that it was the vision of what this company could be that energized us all. We don't see ourselves constrained by the limits of the food service industry. We've got great physical assets, and we're building strong, collaborative relationships with suppliers of all kinds. We're building a system that can become the Amazon.com of the B-to-B world—only ours will make money.

I firmly believe that e-commerce is not just another way to take orders. This is where business is going. It's an external technology initiative that involves the entire company. One of our most important jobs in this new environment is education. I don't think that everyone needs to know every technical detail that makes an e-commerce system work. But I think that everyone in management at an e-commerce company needs to grasp the theory of what this kind of change means so that all their decisions are based on today's business design, not yesterday's. **CIO**

Barbara Moss is CIO of Alliant Foodservice in Deerfield, Ill., the nation's second-largest broadline foodservice distributor. Send column ideas to platform@cio.com.



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Opinion | From the Publisher

gbeach@cio.com

E-Nuf Already

CONVINCED THAT THE "E" REVOLUTION had gone too far and that the other 25 letters of the English alphabet were jealous of e's ascension to adjective status, I fired up my favorite search engines (AltaVista and Northern Light) and went e-fishing for words on the net that had attached the "e" prefix to them.

Here's a sampling of what I found. E-air, e-bank, eBay, e-bet, e-boat, e-boss, e-brand, e-business, e-car, e-card, e-cash, e-casket, e-church, e-city, e-clock, e-clothes, e-college, e-commerce, e-doctor, e-dog, e-enterprise, e-flower, e-furniture, e-game, e-gardner, e-government, e-job, e-library, e-life, e-loan, e-love, e-marketing, e-mocracy, e-money, e-neck, e-network, e-news, e-pet, e-pharmacy, e-postcard, e-publisher, e-religion, e-school, e-security, e-shirt, e-shoe, e-sky, e-sleep, e-snack, e-soap, e-space, e-stamp, e-stock, e-tail, e-tax, e-team, e-text, e-theatre, e-think, e-ticket, e-tour, e-Trade, e-travel, e-tree, e-tutor, e-vineyard, e-vote, e-yada (my favorite!) and e-zoo.

My original intent in compiling this list was to deliver an "e-nuf is e-nuf" message and encourage us all to cease this practice.

But I changed my mind when I reviewed two pieces of CIO research on the webification of corporate America, research that convinced me the "e" revolution will run out of steam by itself as it migrates to another level.

I can hear thousands of CIOs collectively saying to themselves, "Wait one second, web enablement of my corporation is our number-one initiative. What is going to replace it?"



Gary J. Beach

Your company's mission statement and core corporate values will replace the e-revolution whose legacy will be that it accelerated the awareness of technology in our society.

IDG Research recently asked CIOs the following question: Is e-business an extension or core part of your company's overall business model? The response:

E Business is an...	Now	In 18 months
Extension to business model	76%	39%
Core part of business model	24%	58%

SOURCE: CIO INTERNET ATTITUDES STUDY, IDG RESEARCH, NOVEMBER 1999

Moreover, CIO's circulation department has just released the responses to the question, "What percent of your organization's revenues is attributed to e-commerce transactions?"

Percent of EC Transactions	Now	In 12 months
25% or more	7.7%	15.3%
10 to 24.9%	10.2%	18.3%
5 to 9.9%	14.2%	24.0%
Less than 5%	44.5%	28.0%
None	14.5%	11.9%

Yes folks, within 12 to 18 months we will no longer need an e-revolution because nine out of every 10 businesses will be incorporating e-technology into their revenue streams.

And when everyone is doing it, the marketing folks will realize adding the letter "e" to everything is superfluous, proving correct my theory that the e-revolution is about to die. What do you think about the e-revolution? Let me know at gbeach@cio.com.

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The Future of Work

A recent book identifies five trends changing the face of employment

BY IRA MATATHIA AND
MARIAN SALZMAN

In an increasingly competitive world, companies no longer have the luxury of holding on to more employees than they need or workers who are not contributing fully to the bottom line.

As a result, more companies are beginning to pay attention to extending the value of their existing "human resources," recognizing that it is far more expensive to recruit and train new workers than it is to maximize the value of the workers they already have.

One of the new buzzwords that's sprung up is 'headlighting,' which refers to companies taking a close look at where they want to be in the medium to long-term and determining what changes need to be made to ensure they get there. Texas Instruments has been doing some headlighting by listing as far as a year in advance which jobs are in jeopardy and asking those employees, "What do we need to do to broaden you to assume a new job inside or outside this company?" Workers and companies alike have come to find that if they don't spend time now preparing for the future, they might well find they have no role to play once they get there.

Find out

- Which work trends are continuing and which are reversing
- Why employees are becoming more empowered
- How to keep employees satisfied



The perceived decrease in company loyalty has resulted in employees who are far more inclined to take responsibility for their own success rather than pin their hopes on the achievements of any one organization. Those workers best positioned to succeed in the coming decades will be those who recognize that they must continually upgrade their skills and work to maintain or extend their competitive edge, for there is no guarantee that the organization they work for today will need their current skill set tomorrow.

In this shifting world of work, we see five major trends.

1. Full-Time Employees Decrease in Number

Rather than shoulder the financial burden of permanent, full-time employees, many companies are turning to part-time and temporary workers. In North America, temporary services firm Olsten Corp. has found that more than a third of companies employ temporary workers in managerial or professional positions. Among companies using temporary workers, 53 percent utilize accountants, 32 percent retain information systems specialists, 28 percent utilize human resource professionals, and 27

expected to steer companies through the next several decades. Today's supervisors need the same skills as upper-level executives and then some. This is a huge turnaround from just a few years ago, when middle management was being cut at a rate of 23,000 employees per month.

Estimates on just how many contingency workers there are in the American workforce today range from less than 5 percent to 30 percent. It is estimated that this number will grow to 50 percent by 2005 due to advances in technology, which make it possible to work from anywhere. Recently the Human Resources Institute conducted a study called "The Changing Nature of Work." In the 90 companies participating, 25 percent to 35 percent of their work was being done by contingency workers or outside contractors.

2. Computers Replace Humans

Analysts predict that in the coming century, employment as we know it is likely to be phased out in most of the industrialized nations of the world. For the first time in history, human labor is being systematically eliminated from the economic process. A new generation of sophisticated information and communication technologies, together with new forms of business reorganization and management, is wiping out full-time employment for millions of blue- and white-collar workers.

According to commentator Jeremy Rifkin, "The hard reality that economists and politicians are reluctant to acknowledge is that manufacturing and much of the service sector are undergoing a transformation as profound as the one experienced by the agricultural sector at the beginning of the century, when machines boosted production, displacing millions of farmers. We are in the early stages of a long-term shift from 'mass labor' to highly skilled 'elite labor,' accompanied by increasing automation in the production of goods and delivery of services."



Next: Trends for the Near Future

By Ira Matathia and Marian Salzman
The Overlook Press, Woodstock, N.Y.
September 1999, \$26.95

3. Small Offices and Home Offices Grow

As workers begin to rely less on corporate loyalty and more on their own skills, while also taking advantage of the opportunities new technologies afford, more and more of them are setting up shop on their own. SOHO stands for Small Office, Home Office, and is a very chic code word for "free worker" and entrepreneur. Small offices and home offices are expected to increase from 34.7 million in 1997 to 40.2 million by 2000. Men and women work from home in approximately equal numbers, according to the Department of Labor, but women are more likely to work exclusively from the home.

4. Equal-Opportunity Opportunities

The battle for equality is far from over. American women are still struggling to gain power. Almost 90 percent of board seats on Fortune 500 companies are held by men (98 percent of them are white). Results of a survey done by Catalyst (a nonprofit organization that has worked to get women on boards for 25 years) found that women hold just 10.6 percent of the seats on Fortune 500 boards. Eighty-one of these companies, or

Women's Day

AMONG FORTUNE 500 BOARDS OF DIRECTORS

- 16 percent have no women
- 50 percent have one woman
- 30 percent have two women
- 6 percent have three or more

SOURCE: CATALYST

percent use administrative professionals. Forty-five percent of companies surveyed by Olsten plan to increase their use of temporary employees during the next five years, and 51 percent intend to maintain current levels.

Middle management, however, seems to have bounced out of this stagnation and is

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16 percent, have no women on their boards; 238, or nearly 50 percent, have only one; 30 percent have two; and 6 percent have three or more.

Among Fortune 500 companies, only two have female CEOs. Interestingly, the Catalyst survey also found that women hold 60 percent of the wealth in America. In fact, a 1997 survey by Nasdaq found that 47 percent of its shareholders were women. Women use this economic power, but they do it quietly. In the last 10 years, women have started companies at twice the rate of men. Fifty-eight percent of these women worked in the private sector, and 25 percent worked for medium to large companies, according to the Nasdaq study.

In Britain, five years of campaigns by pressure groups have yielded moderate success: 41 percent of the 100 largest British companies today have a female board member, as do 12.8 percent of British companies overall. Women now claim about 2 percent of senior management jobs in Europe, ranging from Britain's 5.8 percent to Germany's 1 percent and Italy's 0.5 percent. In the United States, women account for half of the workforce and hold 10 percent of board seats and 5 percent of senior management jobs.

Frequently, women are making their own breaks. Women in the United States own 8 million companies today, up from 3 million in the mid-1980s. These businesses con-

tribute \$2.38 trillion to the American economy each year. In Germany, one-third of all startups are woman-owned, up from 10 percent in 1975. Altogether, economists estimate, the 150,000 new female-run companies in Eastern Germany alone have created approximately a million new jobs and contributed about \$15 billion to Germany's



A new generation of sophisticated information and communication technologies is wiping out full-time employment for millions of blue-and white-collar workers.

three days to repair it. Expect such services to be available for all types of electronic equipment.

Equipment lessors and business sites. Rather than invest in expensive equipment right away, savvy entrepreneurs will lease the needed equipment or rent a cubicle (or meeting space, as needed) from a business super-

annual gross domestic product. Researchers who study new-business growth in Germany say that companies run by women develop more slowly than those managed by men. One reason is that the profit motive isn't as strong among women entrepreneurs. According to government surveys, women cite earning profits as a fourth or fifth reason for setting up their own companies, after their desire to be self-sufficient and develop their own ideas (male entrepreneurs cite profits as the number-one motive).

site. Also certain to grow are videoconferencing centers and technology consultants, who will advise small businesses on information technology purchases.

An increasing need for skills trainers. The rapid pace of technological change, combined with the growth of contract workers, will create an increasing need for people who can train not only current employees of a company but also freelance workers.

Executive coaches: The next new twist. One of the latest twists on businesses devoted to helping busy people cope is "executive coaches." At a cost of as much as \$500 per month, coaches will make weekly phone calls to clients to help them prioritize their goals and better manage their businesses and their lives.

And, of course, the digital age will continue to spawn new job opportunities for all sorts of high-tech specialists, including multimedia software designers and intranet coordinators. **CIO**

Ira Matathia and Marian Salzman are chief executive officer and worldwide director, respectively, of Young & Rubicam Inc.'s Brand Futures Group in New York City.

5. Hot Jobs for the Millennium

Which occupations will thrive in the next millennium? The following are likely to be on the upswing thanks to the rise in contract workers, SOHOs and temporary workers.

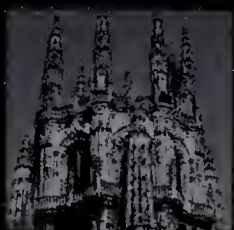
Onsite repair services. When a friend's recently purchased computer broke down, the manufacturer sent a technician to her home within

Temporary Trends

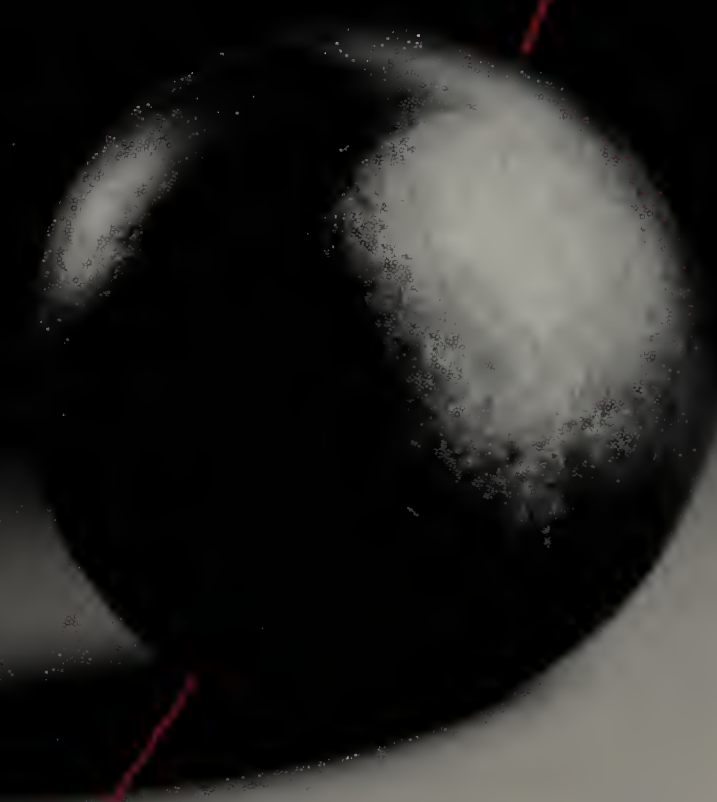
AMONG FIRMS THAT USE TEMPORARY WORKERS

- 53 percent place them in accounting
- 32 percent place them in IS
- 28 percent place them in HR
- 27 percent place them in administrative positions
- 45—percentage of companies who plan to increase their use of temporary employees over the next five years
- 51—percentage that intend to maintain current levels of temporary employees

SOURCE: OLSTEN CORP.



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During the spring and summer of 1999, the following individuals joined many of our advisory board members in helping us recraft CIO's goals and editorial content, the results of which you see in this issue and will be introduced in the coming months. We thank them for their feedback, criticism and indulgence.

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Spotlight: C. Lee Jones

Jones, vice president of information management and technology for Abbott Laboratories' pharmaceutical products division in Abbott Park, Ill., heads a team of 350 employees. Before taking this position in 1996, Jones, an MBA grad, managed manufacturing, R&D, clinical research and marketing units in pharmaceuticals.

In an effort numbingly reminiscent of the recent Y2K debugging, Jones's division is trying to comply with a 1997 ruling from the Food and Drug Administration (FDA) called Code of Federal Regulations, Part 11. "It is a complex rule that isn't clearly understood, even by the FDA," Jones says. Briefly, the Part 11 rule requires that all new and legacy systems as well as

applications that in any way serve to generate data for regulatory purposes be compliant with current FDA standards for validation. This means that every step of the software development, testing and operation has been tested twice, by independent parties, with documentation. All validation testing must be completed and approved by a separate quality assurance organization before the system or application can be used. The FDA's current standards require validation back to the source code.



Attaining compliance "is being interpreted by the FDA as being bigger than the Y2K issue for our industry," Jones says. His organization is overwhelmed by putting all the compliance plans in place. "The rule became law in 1997, and the FDA is now auditing systems and applications against the rule." If a company does not have "adequate" compliance plans in place, and the FDA alone determines adequacy, then the FDA can shut down a company's operations. The difficulty in reaching compliance is exacerbated because many of Abbott's IT vendors cannot fix their legacy applications. According to Jones, the pharmaceutical industry estimates it will cost more than \$15 billion and take at least 10 years to fully comply with the regulation.

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Interview

BY MEG MITCHELL

satish AJMANI

Satish Ajmani is CIO of Santa Clara County—the heart of Silicon Valley. As such, he faces unusual challenges reconciling government responsibilities with citizens' and businesses' needs.

CIO: You are CIO to a county that people equate with unlimited money and technology knowledge. How does that affect your job?

AJMANI: Sixty-six percent of the households here are online. There are people like software engineers who are used to doing business electronically. But the service industry has a lot of lower-paying jobs; there's definitely a polarity. There's a constituency that is not connected, so whatever we do electronically will have to meet those people's needs through kiosks, community-based organizations and people who can help them. We'll always have to maintain the counter system because some people will not do business electronically. They will want to come in and stand in line to pay their bills or fines.

How can government better serve citizens through technology?

Government can piggyback on [Joseph Pine's] idea of the "The Experience Economy," transforming a business transaction and making it an experience. Of course that's tough—both to do the thing and to sell the concept.

I'd like to build an electronic community. Part of that challenge is making [a community portal] persuasive enough to make people want to do business locally. Government can't make them do that, but at least it can provide the opportunity. I'd like people to come to our website and get answers to whatever questions they might have about the labor market, businesses or local political issues. Property assessment, tax collection, buying a dog license, payment of parking fines, court schedules—all that could be done electronically. But I'd also like to have people use this to buy things locally. If you go to Yahoo and buy

flowers, you are supporting a national business. I'd like to have citizens come to our website and support local businesses. It's the small businesses that are suffering [from the influx of technology]. In downtown San Jose many businesses have closed.

The biggest challenge, though, is how slowly things move. There are good reasons for it. Public accountability forces us to do things a certain way. For example, before we make any expenditure over \$100,000, it has to be approved by the board of supervisors. Needless to say that slows down how fast you can move a project. And of course things of this nature don't sell as well as providing welfare. That's my particular challenge. **CIO**

What benefits do you see to getting government online? Let Features Editor Meg Mitchell know at mmitchell@cio.com.





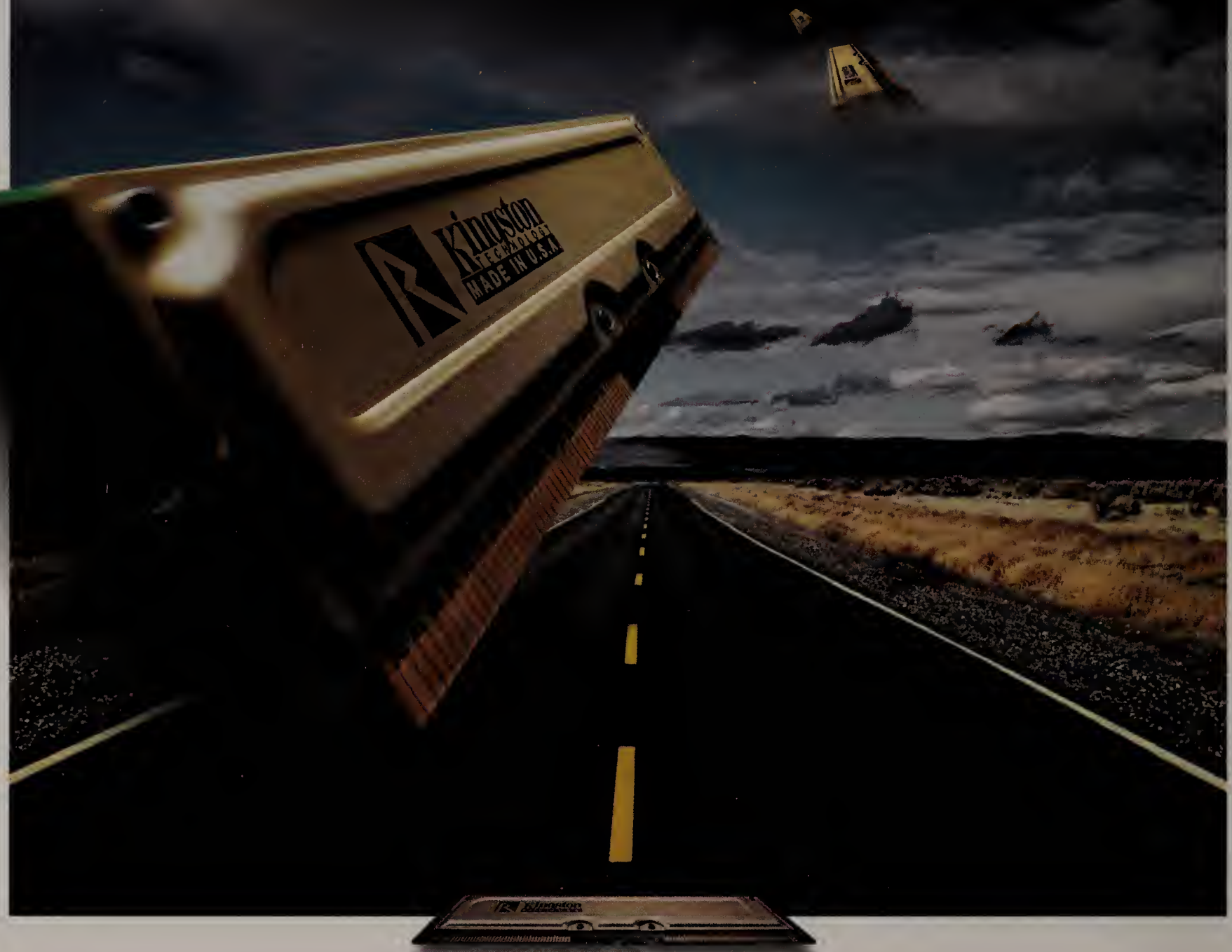
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